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Project Report

PA-229-11
(RSP)

Data Reduction Program Documentation
ALERT

(Effective: April 1971)

C. R. Berndtson
R. H. French
D. E. Nessman

11 June 1971

Prepared for the Advanced Research Projects Agency,
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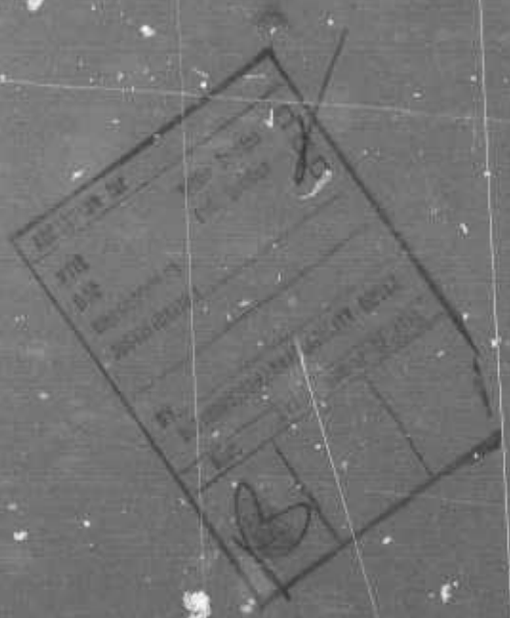

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

LINCOLN LABORATORY

DATA REDUCTION PROGRAM DOCUMENTATION ALERT

(EFFECTIVE: APRIL 1971)

C. R. BERNDTSON
Group 92

R. H. FRENCH
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Philco-Ford Corporation
Editors

PROJECT REPORT, PA-229-11 (RSP)

11 JUNE 1971

56p.

F19628-70-C-0230, ARPA Order-600

L. O. Hoagson Field
Bedford, Mass 01730

207 650

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FOREWORD

This is the eleventh report in the Data Reduction Program Documentation series. It is dated according to the date of completion of the documentation. No implication is made that this program will not subsequently be modified, amended, or superseded; on the contrary, the history of radar data processing is one of continuous evolution of techniques, and it is unrealistic to assume that steady-state has been reached.

The preparation of reports in this series is under the Editorship of Charles R. Berndtson of Lincoln, and of D. Nessman and R. French of Philco-Ford Corporation. Inquiries, suggestions, corrections, criticisms, and requests for additional copies should be directed to C. R. Berndtson.

The principal contributor to this report was G. L. Shapiro (Philco-Ford). Due to the intricate, evolutionary manner in which the programs came into being, the editors regret that it is in general impossible to give due credit to all -- mathematicians or radar analysts or programmers -- who contributed to the definition and writing of the programs.

Alan A. Grometstein

CONTENTS

CONTENTS (cont'd)

COMMON SYMBOLS AND ABBREVIATIONS

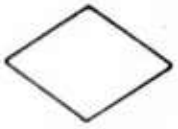
(The units given for certain quantities are the units commonly used for those quantities, unless otherwise noted.)

ADT	ALCOR Data Tape
ALCOR	ARPA-Lincoln C-band Observables Radar
ALTAIR	ARPA Long-Range Tracking and Instrumentation Radar
Alt	Altitude (km)
APS	Average Pulse Shape
ARS	ALTAIR Recording System
Avg	Average, Averaging
Az	Azimuth (deg)
c	Speed of Light
CADJ	Adjusted Calibration Constant (db)
C-band	ALCOR frequency, 5664 MHz (NB) and 5667 MHz (WB)
DBLT	Wide Band Pulse Doublet
DCO	Designations and Communications Operator
El	Elevation (deg)
EOF	End of File
GMT	Greenwich Mean Time
h	Hours
Hz	Hertz
IF	Intermediate Frequency
in	Inches
IRV	Inter-Range Vector
LC	Left Circular Polarization
lsb	Least Significant Bit
min	Minutes
NB	Narrow Band
NRTPOD	Non-real Time Precision Orbit Determination Program
POD	Project PRESS Operation and Data Summary Report
Phase	Presented in deg
PRF	Pulse Repetition Frequency (pps)
PRI	Pulse Repetition Interval (s)
pps	Pulses per second
pts	Points

R	Range (km)
$\dot{R}$	Range Rate (km/s)
rad	Radians
RC	Right Circular Polarization
RCS	Radar Cross Section (dbsm)
RF	Radio Frequency
s	Seconds
SD_w	Standard Deviation of Wake Velocity
SDBLT	Wide Band Slaved Pulse Doublet
S/N	Signal-to-noise Ratio
T	Time
TAL	Time After Launch (s)
Tr	Traverse Angle (deg)
UHF	ALTAIR Frequency; 415 MHz
V	Velocity
V_d	Doppler Velocity
V_w	Mean Wake Velocity
VHF	ALTAIR Frequency; 155.5 MHz
WB	Wide Band
WBS	Wide Band Slaved
WTR	Western Test Range
θ	Total Off-axis Angle (deg)
λ	Wavelength
*	Denotes Multiplication

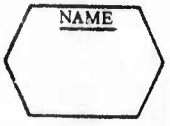
FLOW DIAGRAM SYMBOLS

PROCESS, ANNOTATION



DECISION

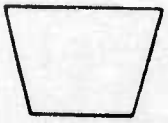
TERMINATOR



SUBROUTINE: where NAME is the entry call into the subroutine

CONNECTOR: where P specifies a page in the flow diagram, and L designates a statement number in the program listing or a reference point in the flow diagram

CONNECTOR: where X implies a continuation of the diagram to the next page



INPUT/OUTPUT OPERATION

MAGNETIC TAPE

PUNCHED CARD

DISK

ALERT

I. PURPOSE AND UTILIZATION

A. Source of Data

ALCOR[1]

B. Data Input

ALCOR Data Tape (ADT)

C. Description

ALERT is designed to obtain a summary of the data available on an ADT tape. Output is normally requested every 10th pulse. When WBS, DBLT, or SDBLT waveforms are operative, ALERT should be requested every pulse. The data presented in an ALERT listing are essential to run other ALCOR programs.

D. Output

A listing of metric and radar status data.

continue on page 2

from page 1

II. DESCRIPTION

ALERT gives a listing of metric and radar status information correlated with pulse ~~nos.~~ numbers which are necessary to run other ALCOR programs. The program should be run every pulse when WBS, DBLT, or SDBLT waveforms are in use.

The items listed by ALERT are determined as follows:

R, Az, and El are corrected:

$$R = IRANGE + TRBIAS + TTCOR + RRCOR - RCORF$$

$$Az = IAZ + AZBIAS$$

$$El = IEL + ELBIAS - ECORF$$

where

IRANGE is uncorrected R

TRBIAS is range bias

TTCOR (transit time correction) = $R\dot{R}/c$

RRCOR is range doppler coupling correction

RCORF is tropospheric refraction correction

IAZ is Az encoder angle

AZBIAS is Az bias (Calibration Record Word 602)

IEL is El encoder angle

ELBIAS is El bias (Calibration Record Word 603)

ECORF is tropospheric refraction correction

Alt is computed as follows:

$$Alt = (R^2 + R_e^2 + 2RR_e \sin El)^{\frac{1}{2}} - R_e$$

where R_e = radius of earth (6378.145 km)

RCS is always the NB real time RCS whether the ADT is NB or WB. It is obtained:

$$\text{LC RCS} = (\text{IPPRCS})\ (80/255) - 40$$

$$\text{RC RCS}^{\#} = (\text{IOPRCS})\ (80/255) - 40$$

where

IPPRCS is Data Record Byte 802

IOPRCS is Data Record Byte 803

A/D count is given for Gate 52 unless IW117 = 1 is input. In the latter case, IMOVP is given.[##]

The angle offsets (ΔTr and ΔEl) are determined:

$$\Delta \text{Tr} = \text{AZGRAD}\ (2\pi)\ (10^{P_a/20})\ (\cos Z1)$$

$$\Delta \text{El} = \text{ELGRAD}\ (2\pi)\ (10^{P_e/20})\ (\cos Z2)$$

where

AZGRAD is the traverse scaling factor (revolutions/unit error), Calibration Record Word 612

ELGRAD is the elevation scaling factor (revolutions/unit error), Calibration Record Word 613

$10^{P/20}$ is the normalized error voltage

P_a (db) = ΔTr (db) - REF (db)

P_e (db) = ΔEl (db) - REF (db)

[#] Not an output at present.

[##] IMOVP indicates whether primary and offset range gates are being moved manually; 62 to 66 counts: not moved; < 62 or > 66 counts: are moved; the separation between the primary and offset gates remains constant.[2]

ΔTr (db), ΔEl (db), and REF (db) are found by indexing the amplitude reference table (Calibration Record Words 256-383) with the log detector counts obtained in the ADT data record for the ΔTr, ΔEl, and reference channels.

Z1 = ΔTr phase - REF phase + AGAMA

Z2 = ΔEl phase - REF phase + EGAMA

ΔTr phase, ΔEl phase, and REF phase are found by indexing the phase reference table (Calibration Record Words 1-255) with the phase detector counts obtained in the data record.

AGAMA is a phase offset between the reference channel and the ΔTr channel, found in Calibration Record Word 596

EGAMA is a phase offset between the reference channel and the ΔEl channel, found in Calibration Record Word 597

Peak transmit power is determined:

NB POWER = PWRCN + PWRSN log XPKPWR

WB POWER = PWRSN + PWRSW log XPKPWR

where

PWRCN is Calibration Record Word 620

PWRSN is Calibration Record Word 621

PWRCW is Calibration Record Word 622

PWRSW is Calibration Record Word 623

XPKPWR is Data Record Byte 344

The type of returned pulse is obtained from Data Record Byte 817, Bits 1-4, where:

Code	Pulse Return
0	NB
1	WB
2	Phantom (not expected on ADT)
3	WBS

Code	Pulse Return
4	not used
5	DBLT
6	not used
7	SDBLT

Range offset is obtained from Data Record Bytes 832, 833, and 834.

DBLT waveform status information includes:

	Calibration Record Word No.
Alt at which DBLT is initiated	643
Alt at which DBLT is terminated	644

The following offset range scan status information is listed:

Exo-atmospheric	Calibration Record Word No.
Alt at which slaved mode is initiated	631
Alt at which slaved mode is terminated	632
No. of dwells/scan	633
Initial range offset (m)	634
Range offset increment (m)	635
Total no. of pulses/dwell	636

Endo-atmospheric	Calibration Record Word No.
Alt at which slaved mode is initiated	637
Alt at which slaved mode is terminated	638
No. of dwells/scan	639
Initial range offset (m)	640
Range offset increment (m)	641
Total no. of pulses/dwell	642

PRF is IPRF, determined from the transmitted PRF for the particular waveform on the ADT.#

See Ref. 2, Appendix F.

Radar status is obtained:

Type of Information	Column Heading	Code	Status	Source
Range	R	D	Designated mode	Data Record Byte 816, Bits 6-8
		T	Track mode	
		A	Automatic acquisition mode	
		C	Coast mode	
	A	O	NB R not slaved to WB R	Data Record Byte 814, Bit 3
		S	NB R slaved to WB R	
	N	N	NB R into target tracker	Data Record Byte 814, Bit 6
		W	WB R into target tracker	
	G	O	Initially set to O	Data Record Byte 814, Bit 7
		T	Alternates with every track transfer	
	E	C	Tracking target centroid	Data Record Byte 818, Bit 8
		E	Tracking leading edge of target	
Angle	A	D	Designated mode	Data Record Byte 819, Bits 6-8
		T	Track mode	
		W	Wait mode	
		C	Coast mode	
	N	2	Angle servo type 2	Data Record Byte 818, Bit 5
		1	Angle servo type 1	
	G	H	Maximum angle servo bandwidth	Data Record Byte 818, Bit 6
		L	Minimum angle servo bandwidth	
Miscellaneous	M	*	Not used	
	I	O	Skin track mode	Data Record Byte 814, Bit 1
		B	Beacon track mode	

Type of Information	Column Heading	Code	Status	Source
	S	N	Detection normal	Data Record Byte 819, Bit 1
		O	Detection override	
	C	O	NB transmission only	Data Record Byte 818, Bit 4
		W	NB/WB transmission	
RD Designation Source	R	D	Designation source selected by DCO	
		P	Current track file	Data Record Byte 815, Bits 7 and 8
		C	Manual	
		*	Not used	
	D	T (1-4)	Track files (1-4)	
		N (1-4)	Nominal track files (1-4)	
		I (1-4)	In-flight (IRV) messages	Data Record Byte 815, Bits 1-4
		F (1-3)	Fixed point	
		B*	Boresight tower	
		P*	PRESS track file	
Waveform	W	O	No WBS or SDBLT	Data Record Byte 817, Bit 5
		S	WBS or SDBLT	
	B	O	Not used	
		N	Endo offset range scan	Data Record Byte 817, Bit 6
		X	Exo offset range scan	
	S	O	Not used	
		M	Manual offset range scan	Data Record Byte 817, Bit 7
		A	Automatic offset range scan	
	D	O	No DBLT or SDBLT	Data Record Byte 817, Bit 8
		D	DBLT or SDBLT	

III. OPERATION

A. Input

Title

Launch Time (GMT total ms)

A/D option

First and last pulse nos. of processing intervals

Skip interval (pulses)

No. of processing intervals

A sample input is shown in Appendix A.

CARD 1 (I10, 3I5, 1X, A4)

(Col.)		
1-10	ILNCH	Launch time in GMT total ms
11-15	NVALS	No. of processing intervals
16-20	IW117	A/D option: 0 = Gate 52; 1 = IMOVP
21-25	IAUTO[#]	0: NSKIP = 0 during WBS, DBLT, and SDBLT operation 1: NSKIP used as input
27-30	TITL	Title for listing

CARD 2 (6I10)

1-10	NSTART(1)	First pulse no. of initial processing interval
11-20	NSTOP(1)	Last pulse no. of initial processing interval
21-30	NSKIP(1)	No. of pulses between each line output
31-40	NSTART(2)	First pulse no. of second processing interval
41-50	NSTOP(2)	Last pulse no. of second processing interval
51-60	NSKIP(2)	No. of pulses between each line output

Repeat Card 2 as necessary.

[#] Applies only to WB ADT's.

B. Output

All input parameters are summarized at the beginning of the listing. This is followed by a summary of the offset range scan parameters in effect for the mission, and a summary of the meaning of all mnemonics that can appear in an ALERT listing.

The ALERT listing includes the following: time (TAL and GMT h, min, s, and ms), Alt, R, $\dot{R}$,[#] Az, El, NB LC RCS, A/D count (Gate 52 or IMOVP), Tr error,[##] El error, LC attenuation,[†] peak power, range offset, pulse no. and type, and status information. Status information is listed only when a change occurs.

A sample listing is presented in Appendix B.

[#] This $\dot{R}$ is computed by the Real Time Program, and only approximates the true $\dot{R}$. The best estimate of $\dot{R}$ should be computed by differentiating R, which is accurate.

[##] Called Az error in listing.

[†] Called AGC in listing.

IV. PROGRAM LIMITATIONS

NVALS ≤ 50 processing intervals

V. PROGRAMMING

A. ALERT (see Appendices C and D.)

ALERT is the control section of ALERT. It reads the input cards, calls the subroutines, and lists the desired data.

B. HEDADT (see Appendix E.)

Subroutine HEDADT unpacks the ADT header record which contains bandwidth, reel no., WTR no., data of mission, and mission designator. The call statement is HEDADT [ISIG, # INBUF(1), IEQM(1)]

INPUT

INBUF(1)	First word in the ADT header record##

OUTPUT

IEQM(1)	IZBAND	(bandwidth: 1 = WB, 0 = NB)
IEQM(2)	ITREEL	(reel no.)
IEQM(3)	ITWTR	(WTR no.)
IEQM(4)	IMTH	
IEQM(5)	IDAY	(Date of test)
IEQM(6)	IYR	
IEQM(7-9)	ITDESG	(mission designator)

C. UNPACK (see Appendix F.)[2]

Subroutine UNPACK unpacks the raw data from the ADT, and translates it into a format usable by the IBM 360/67 computer.

#Not used.

##INBUF(2) to INBUF (1803) contain the remaining words in the record.

D. READJS[2]

The first call to subroutine READJS opens the file and reads the ADT header record. The second call to READJS reads the ADT calibration record and stores the values in a buffer area. ALERT extracts the individual calibration values it requires. Each subsequent call to READJS reads an ADT data record consisting of eight ALCOR pulses.

E. REFC (see Appendix G.)

The tropospheric refraction correction subroutine, REFC, is based on tropospheric refraction tables in PPP-36.[3] A modified version of this subroutine is now in use.

The call statement is REFC (E, R, DEE, DRR).

E = Uncorrected El (must be between 0° and 90°)
R = Uncorrected R
DEE = El tropospheric correction
DRR = R tropospheric correction

The corrected values to be computed after exiting from the REFC subroutine are:

El = E-DEE
R = R-DRR

F. STATUS (see Appendix H.)

Subroutine STATUS examines the designated status words, checks for changes, and returns to control section for output. The call statement is STATUS.

STORED IN COMMON

ISTAT	Array of status mnemonics
IALSW	Not used
ISTSW	Change of status indicator: 0 = no change; 1 = change

REFERENCES

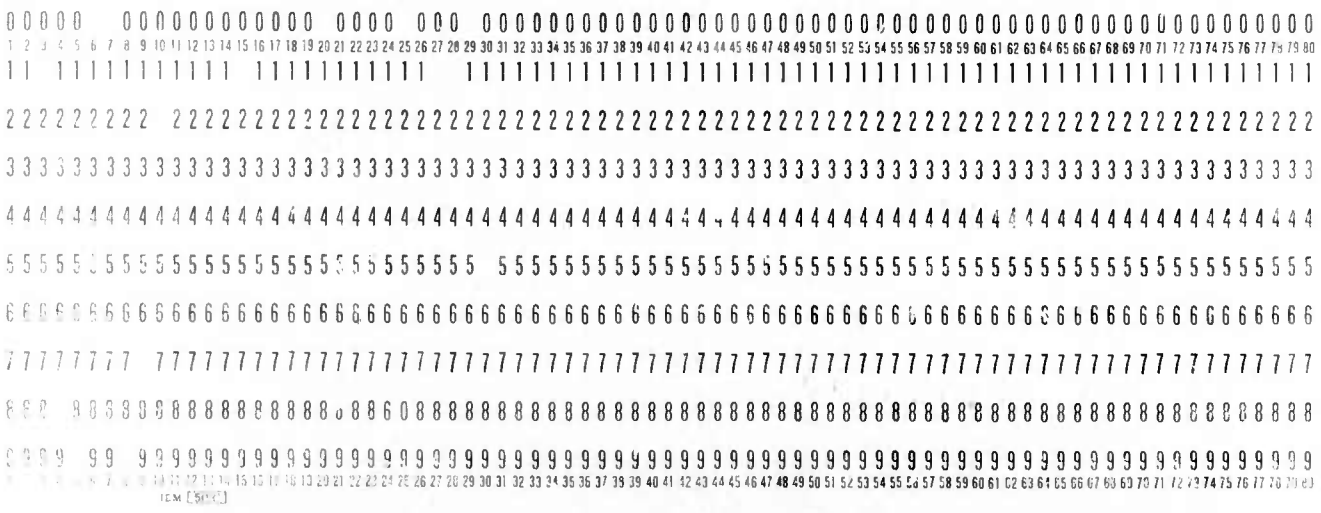
1. "ALCOR Data Users Manual", LM-86, Lincoln Laboratory, M.I.T. (17 June 1970), UNCLASSIFIED.

2. "Data Reduction Program Documentation, ALCOR Tape Read Package, (Effective: April 1971)", PA-229-7, Lincoln Laboratory, M.I.T. (26 April 1971), UNCLASSIFIED.

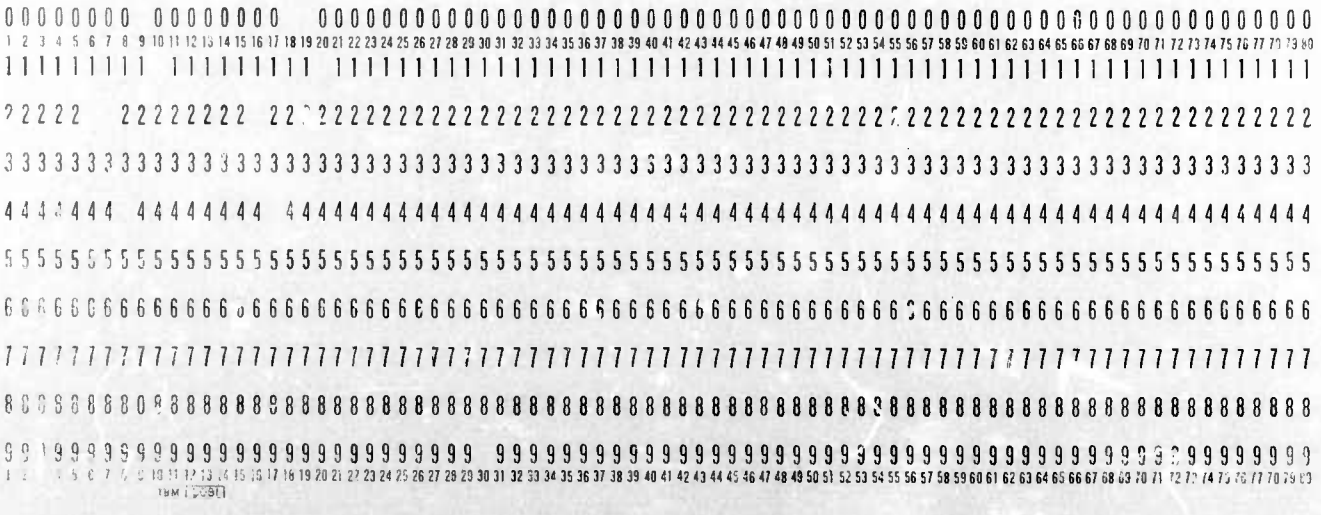
3. J. P. Penhune, "Refraction Corrections for the TRADEX Radar", PPP-36 Lincoln Laboratory, M.I.T. (21 April 1965), UNCLASSIFIED.

APPENDIX A
ALERT INPUT

18900972 1 0 0 1J05



22401 24001 9



APPENDIX B
ALERT OUTPUT

```
ALERT-ALCOR     BAND = NB     REEL NO. =       '     TITLE = 1105    DATE =  3/ 3/71

 START   STOP   SKIP            START   STOP   SKIP            START   STOP   SKIP            START   STOP   SKIP
 22401   24001     9

          LAUNCH TIME (TOTAL SECS) =  18900.972      IW117 =      0


EXO-ATMOSPHERIC                                          ENDO-ATMOSPHERIC SCAN

     UPPER WBS SCAN ALTITUDE (KM) =       -0.0               UPPER WBS SCAN ALTITUDE (KM) =       -0.0
     LOWER WBS SCAN ALTITUDE (KM) =       -0.0               LOWER WBS SCAN ALTITUDE (KM) =       -0.0
     NUMBER OF DWELLS PER SCAN    =        10.               NUMBER OF DWELLS PER SCAN    =        78.
     INITIAL RANGE OFFSET (M)     =      29.98               INITIAL RANGE OFFSET (M)     =      29.98
     RANGE OFFSET INCREMENT (M)   =        0.0               RANGE OFFSET INCREMENT (M)   =        0.0
     NO.OF SLAVED PRIS PER DWELL  =        40.               NO.OF SLAVED PRIS PER DWELL  =        16.

UPPER DOUBLET MODE ALTITUDE (KM) =       -0.0          LOWER DOUBLET MODE ALTITUDE (KM) =       -0.0


THE CODE ( C ) LISTED IN THE OUTPUT HEADING DEFINES THE
CURRENT PULSE AS HAVING THE FOLLOWING WAVEFORM :

  CODE     PULSE RETURN
  ----     ------------
    0      NB RETURN
    1      WB RETURN
    2      PHANTOM (NOT TO BE USED)
    3      WB SLAVED WINDOW RETURN
    4      (NOT USED)
    5      WB PULSE DOUBLET RETURN
    6      (NOT USED)
    7      WB PULSE DOUBLET SLAVED WINDOW RETURN


THE CODE (RANGE) LISTED IN THE STATUS OUTPUT DEFINES THE FOLLOWING :

    R      =  O   DESIGNATION
           =  T   TRACK
           =  A   AUTO-ACQUISITION
           =  C   COAST

    A      =  D   NB RANGE INPUT ESTIMATOR NOT SLAVED TO WB
           =  S   NB IS SLAVED TO WB

    N      =  N   NB RANGE INTO TARGET TRACKER
           =  W   WB RANGE INTO TARGET TRACKER

    G      =  O   D AND/OR WILL ALTERNATE WITH EVERY TRACK
           =  T   TRANSFER  (FIRST SET = 0)

    E      =  C   CENTER OR CENTROID TRACK
           =  E   EDGE TRACK
```

THE CODE (ANG) LISTED IN THE STATUS OUTPUT DEFINES THE FOLLOWING:

A	=	D	DESIGNATE
	=	T	TRACK
	=	W	WAIT
	=	C	COAST
N	=	2	ANGLE TYPE 2 SERVO
	=	1	ANGLE TYPE 1 SERVO
G	=	H	MAXIMUM SERVO BANDWIDTH
	=	L	MINIMUM ANGLE SERVO BANDWIDTH

THE CODE (MISC) LISTED IN THE STATUS OUTPUT DEFINES THE FOLLOWING :

M	=	*	(NOT USED)
I	=	0	BEACON TRACKER OFF
	=	B	BEACON TRACKER ACTIVE
S	=	N	DETECTION NORMAL
	=	O	DETECTION OVERRIDE
C	=	0	NB TRANSMISSION ONLY
	=	W	NB/WB TRANSMISSION

THE CODE (R D) LISTED IN THE STATUS OUTPUT DEFINES THE FOLLOWING :

R	=	D	DCOS-DESIGNATION SOURCE SELECTED BY DCO
	=	P	PRIME TF (CURRENTLY TRACKFILE)
	=	C	CONSOLE (JOYSTICK,BUTTONS,ETC.)
	=	*	(NOT USED)

D	DCO SELECTED DESIGNATION SOURCE		
	=	T(1-4)	TRACKFILE
	=	N(1-4)	NOMINAL
	=	I(1-8)	INFLIGHT MESSAGES
	=	F(1-3)	FIXED POINT
	=	B*	BORESIGHT TOWER
	=	P*	PRESS

THE CODE (WBSD) LISTED IN THE STATUS OUTPUT DEFINES THE FOLLOWING :

W	=	0	WIDE BAND SLAVED MODE NOT IN EFFECT
	=	S	IN EFFECT
B	=	0	(BIT NOT BEING USED YET)
	=	N	ENDO SCAN IN PROGRESS
	=	X	EXO SCAN IN PROGRESS
S	=	D	(BIT NOT BEING USED YET)
	=	M	MANUAL WBS SCAN
	=	A	AUTOMATIC WBS SCAN
D	=	0	DOUBLET MODE OFF
	=	D	DOUBLET MODE ON

BAND = NB

TIME (SECS)	HGHT (KM)	RANGE (KM)	RDOT (M/SEC)	AZIM DEG	ELEV DEG	LC DBM	A/D CNT	AZERR DEG	ELERR DEG	AGC DB	PWR DBW	C	GMT HR	M	SECS	R.OFFST (M)	RANGE *****	AVG ***	MISC ****	PRF ***	R *	D **	WBSC ****	PRI
1668.186	383.3	1076.1	-6441.2	59.91	16.36	-2	56	0.005	0.015	0.0	62	D	5	42	49.158	0.0	TONTC	TZH	*ONW	50	P	P*	0000	22401
1668.386	382.8	1076.8	-6441.9	59.91	16.37	0	61	-0.015	0.024	0.0	62	D	5	42	49.358	0.0								22411
1668.586	382.4	1075.5	-6442.5	59.92	16.38	-8	43	0.012	0.041	0.0	62	D	5	42	49.558	0.0								22421
1668.786	382.1	1074.2	-6443.1	59.92	16.39	-2	29	-0.073	0.165	0.0	62	D	5	42	49.758	0.0								22431
1668.986	381.7	1072.9	-6443.7	59.93	16.40	-2	57	-0.019	-0.010	0.0	62	D	5	42	49.958	0.0								22441
1669.186	381.3	1071.6	-6444.4	59.93	16.40	-6	45	0.008	-0.035	0.0	62	D	5	42	50.158	0.0								22451
1669.386	380.8	1070.3	-6445.0	59.93	16.41	-4	53	0.007	0.039	0.0	62	D	5	42	50.358	0.0								22461
1669.586	380.4	1069.1	-6445.5	59.93	16.42	-4	43	0.004	0.066	0.0	62	D	5	42	50.558	0.0								22471
1669.786	380.0	1067.8	-6446.1	59.93	16.43	-5	46	0.033	-0.008	0.0	62	D	5	42	50.758	0.0								22481
1669.986	379.7	1066.5	-6446.9	59.93	16.44	-7	59	-0.013	-0.007	0.0	62	D	5	42	50.958	0.0								22491
1670.186	379.3	1065.2	-6447.5	59.94	16.45	-3	58	-0.007	-0.013	0.0	62	D	5	42	51.158	0.0								22501
1670.386	378.9	1063.9	-6448.1	59.94	16.46	-6	70	-0.015	-0.029	0.0	62	D	5	42	51.358	0.0								22511
1670.586	378.4	1062.6	-6448.6	59.94	16.46	-6	60	-0.002	-0.006	0.0	62	D	5	42	51.558	0.0								22521
1670.786	378.0	1061.3	-6449.3	59.94	16.47	-4	53	0.0	0.001	0.0	62	D	5	42	51.758	0.0								22531
1670.986	377.7	1060.0	-6450.1	59.94	16.48	-7	44	-0.011	-0.012	0.0	62	D	5	42	51.958	0.0								22541
1671.186	377.2	1058.7	-6450.5	59.94	16.49	-5	39	-0.069	0.042	0.0	62	D	5	42	52.158	0.0								22551
1671.386	376.8	1057.5	-6451.2	59.95	16.50	-2	62	-0.006	0.004	0.0	62	D	5	42	52.358	0.0								22561
1671.586	376.4	1056.2	-6451.7	59.95	16.51	-13	39	-0.050	0.040	0.0	62	D	5	42	52.558	0.0								22571
1671.786	376.0	1054.9	-6452.6	59.96	16.51	-2	59	0.024	0.001	0.0	62	D	5	42	52.758	0.0								22581
1671.986	375.5	1053.6	-6453.2	59.96	16.52	-1	77	0.000	0.001	0.0	62	D	5	42	52.958	0.0								22591
1672.186	375.2	1052.3	-6454.3	59.97	16.53	3	61	-0.005	0.020	0.0	62	D	5	42	53.158	0.0								22601
1672.386	374.8	1051.0	-6454.8	59.97	16.54	0	67	0.005	-0.002	0.0	62	D	5	42	53.358	0.0								22611
1672.586	374.3	1049.7	-6455.5	59.96	16.54	5	69	-0.014	0.011	0.0	62	D	5	42	53.558	0.0								22621
1672.786	373.8	1048.4	-6456.1	59.96	16.55	-6	27	0.165	0.153	0.0	62	D	5	42	53.758	0.0								22631
1672.986	373.4	1047.1	-6456.6	59.97	16.56	-1	53	-0.042	0.031	0.0	62	D	5	42	53.958	0.0								22641
1673.186	372.9	1045.8	-6457.1	59.97	16.56	0	34	0.039	0.002	0.0	62	D	5	42	54.158	0.0								22651
1673.386	372.6	1044.5	-6457.6	59.97	16.57	-3	63	-0.006	0.007	0.0	62	D	5	42	54.358	0.0								22661
1673.586	372.2	1043.3	-6458.2	59.97	16.58	-11	47	0.024	0.021	0.0	62	D	5	42	54.558	0.0								22671
1673.786	371.8	1042.0	-6458.8	59.97	16.59	-5	51	0.007	-0.013	0.0	62	D	5	42	54.758	0.0								22681
1673.986	371.4	1040.7	-6459.4	59.98	16.60	-11	62	-0.021	0.019	0.0	62	D	5	42	54.958	0.0								22691
1674.186	371.0	1039.4	-6459.9	59.98	16.61	-17	18	-0.558	-0.207	0.0	62	D	5	42	55.158	0.0								22701
1674.386	370.6	1038.1	-6460.5	59.99	16.62	-1	28	0.085	-0.011	0.0	62	D	5	42	55.358	0.0								22711
1674.586	370.0	1036.8	-6461.1	59.99	16.62	-14	59	-0.000	0.007	0.0	62	D	5	42	55.558	0.0								22721
1674.786	369.6	1035.5	-6461.7	59.99	16.63	-1	44	-0.043	0.011	0.0	62	D	5	42	55.758	0.0								22731
1674.986	369.2	1034.2	-6462.3	59.99	16.64	0	56	-0.008	0.047	0.0	62	D	5	42	55.958	0.0								22741
1675.186	368.8	1032.9	-6463.0	59.99	16.64	-5	33	-0.013	0.285	0.0	62	D	5	42	56.158	0.0								22751
1675.386	368.4	1031.6	-6463.7	60.00	16.65	1	49	-0.023	0.034	0.0	62	D	5	42	56.358	0.0								22761
1675.586	367.9	1030.3	-6465.0	60.00	16.66	0	50	-0.004	-0.001	0.0	62	D	5	42	56.558	0.0								22771
1675.786	367.5	1029.0	-6465.7	60.01	16.67	-2	49	-0.017	0.016	0.0	62	D	5	42	56.758	0.0								22781
1675.986	367.1	1027.7	-6466.4	60.01	16.67	0	52	0.012	0.001	0.0	62	D	5	42	56.958	0.0								22791
1676.186	366.7	1026.4	-6467.1	60.01	16.68	-5	50	-0.024	0.078	0.0	62	D	5	42	57.158	0.0								22801
1676.386	366.3	1025.2	-6467.8	60.01	16.69	-8	54	-0.010	-0.017	0.0	62	D	5	42	57.358	0.0								22811
1676.586	366.0	1023.9	-6468.5	60.01	16.70	2	38	-0.014	0.072	0.0	62	D	5	42	57.558	0.0								22821
1676.786	365.5	1022.6	-6469.3	60.01	16.71	-2	39	-0.025	-0.023	0.0	62	D	5	42	57.758	0.0								22831
1676.986	365.1	1021.3	-6469.9	60.01	16.72	1	53	0.005	-0.030	0.0	62	D	5	42	57.958	0.0								22841
1677.186	364.7	1020.0	-6470.3	60.01	16.73	0	46	0.014	-0.015	0.0	62	D	5	42	58.158	0.0								22851
1677.386	364.3	1018.7	-6471.1	60.01	16.74	0	55	0.032	-0.009	0.0	62	D	5	42	58.358	0.0								22861
1677.586	363.9	1017.4	-6471.7	60.01	16.75	-6	63	0.015	0.025	0.0	62	D	5	42	58.558	0.0								22871
1677.786	363.5	1016.1	-6473.0	60.02	16.76	-3	47	-0.012	-0.009	0.0	62	D	5	42	58.758	0.0								22881
1677.986	363.1	1014.8	-6473.6	60.02	16.76	1	61	0.022	0.016	0.0	62	D	5	42	58.958	0.0								22891
1678.186	362.8	1013.5	-6474.2	60.02	16.78	0	61	-0.006	-0.003	0.0	62	D	5	42	59.158	0.0								22901
1678.386	362.4	1012.2	-6474.6	60.02	16.79	1	29	0.355	-0.134	0.0	62	D	5	42	59.358	0.0								22911
1678.586	362.0	1010.9	-6475.1	60.02	16.80	1	60	0.007	-0.013	0.0	62	D	5	42	59.558	0.0								22921

APPENDIX C
ALERT PROGRAM LISTING

```
      DOUBLE PRECISION TLNCH,D1000,TAL,TOTL
C
      COMMON/ICOM/INBUF(1803),IAZ,IEL,INDEX,IPPRCS,IORS,IRANGE,IPKPWR,IRSTA00010
     1IOT,IALT,INDAZ,JNDAZ,INDEL,IRB54,IRB85,ICPRCS,I240B1,I240B2,I240B3STA00020
     1,I241B1,I241B2,I241B3,XPPAGC,IBETA,NEWA,IBAND,NSW,RBIAS(8),ISVPRI,
     1IHRS,IMIN,ISEC,IMSEC,ISTAT(21),TRBIAS,ISTAT1,ISTAT2,ISTAT3,ISTAT4,STA00040
     1IALSW,ISTSW,NBWB,ISIGNO,I115B2,JCON,NBEG,NEND,ITST,NUMPRI,XOPAGC,
     1ITBAND,ITAPNO,IPRF,IPOLAR,ISSERR,PIFA(16),OIFA(16),PFSA,OFSA,
     1PSSA,OSSA,PSSL,OSSL,ICODE,I273B5,I273B6,I273B7,I273B8,IMOVP,IMCVO,
     1IOFFST
C
      DIMENSION XNBUF(1803),                    QBIAS(8),XKRCS(5)
      DIMENSION XATBL(128),XFZLN(255)
      DIMENSION IEQM(9),ITDESG(3)
      DIMENSION NSTART(50),NSTOP(50),NSKIP(50)
      DIMENSION DW(14),IOLDS(18)
C
      EQUIVALENCE(XNBUF(1),INBUF(1))
      EQUIVALENCE (IEQM(1),NWBAN ),(IEQM(2),ITAPEN),(IEQM(3),ITWTR),
     2(IEQM(4) ,IMTH  ),(IEQM(5),IDAY) ,(IEQM(6),IYR   ),
     3(IEQM(7),ITDESG(1))
C
 2008 FORMAT('0',10X,'THE CODE ( C ) LISTED IN THE OUTPUT HEADING DEFINE
     1S THE'/11X,'CURRENT PULSE AS HAVING THE FOLLOWING WAVEFORM 0 '//
     213X,'CODE    PULSE RETURN'/13X,'----    -----------'/15X,'0     NB
     3 RETURN'/15X,'1     WB RETURN'/15X,'2     PHANTOM (NOT TO BE USED)
     4   '/15X,'3     WB SLAVED WINDOW RETURN'/15X,'4     (NOT USED)'/
     515X,'5     WB PULSE DOUBLET RETURN'/15X,'6     (NOT USED)'/15X,'7
     6    WB PULSE DOUBLET SLAVED WINDOW RETURN'///)
 2004 FORMAT('0',10X,'THE CODE (RANGE) LISTED IN THE STATUS OUTPUT DEFIN
     1ES THE FOLLOWING 0'//15X,'R     = D   DESIGNATION'/21X,'=  T   TR
     2ACK'/21X,'=  A   AUTO-ACQUISITION'/21X,'=  C   COAST'//15X,'A
     3=  0   NB RANGE INPUT ESTIMATOR NOT SLAVED TO WB'/21X,'=  S   NB I
     4S SLAVED TO WB'//15X,'N     = N   NB RANGE INTO TARGET TRACKER'/
     521X,'=  W   WB RANGE INTO TARGET TRACKER'//15X,'G     = O   O AND
     6T WILL ALTERNATE WITH EVERY TRACK'/21X,'=  T   TRANSFER  (FIRST SE
     7T = 0)'//15X,'E     = C   CENTER OR CENTROID TRACK'/21X,'=  E   E
     8DGE TRACK'/)
 2005 FORMAT('1',10X,'THE CODE (ANG) LISTED IN THE STATUS OUTPUT DEFINES
     1 THE FOLLOWING0'//15X,'A     = D   DESIGNATE'/21X,'=  T   TRACK'/
     2  21X,'=  W   WAIT'/21X,'=  C   COAST' //15X,'N     = 2   ANGLE T
     3YPE 2 SERVO'/21X,'=  1   ANGLE TYPE 1 SERVO' //15X,'G     = H   M
     4AXIMUM SERVO BANDWIDTH'/21X,'=  L   MINIMUM ANGLE SERVO BANDWIDTH'
     5/  )
 2006 FORMAT('0',10X,'THE CODE (MISC) LISTED IN THE STATUS OUTPUT DEFINE
     1S THE FOLLOWING 0'//15X,'%     = *   (NOT USED)'//15X,'
     2I     = 0   BEACON TRACKER OFF' /21X,'=  8   BEACON TRACKER ACTIV
     3E'//15X,'S     = N   DETECTION NORMAL' /21X,'=  0   DETECTION OVE
     4RRIDE'  //15X,'C     = 0   NB TRANSMISSION ONLY' /21X,'=  W   NB/
```

```
     5WB TRANSMISSION'/)
 2007 FORMAT('0',10X,'THE CODE (R D) LISTED IN THE STATUS OUTPUT DEFINES
     1 THE FOLLOWING 0'//15X,'R      =  D   DCDS-DESIGNATION SOURCE SELEC
     2TED BY DCO'/21X,'=  P   PRIME TF (CURRENTLY TRACKFILE) '
     3            /21X,'=  C   CONSOLE (JOYSTICK,BUTTONS,ETC.) '
     4            /21X,'=  *   (NOT USED)' //21X,'DCO SELECTED DESIGNATIO
     5N SOURCE'   /15X,'D      =  T(1-4)   TRACKFILE '
     6            /21X,       '=  N(1-4)   NOMINAL    '
     7            /21X,       '=  I(1-4)   INFLIGHT MESSAGES'
     8            /21X,       '=  F(1-3)   FIXED POINT    '
     9            /21X,       '=  B*       BORESIGHT TOWER  '
     A            /21X,       '=  P*       PRESS      '  /)
 2009 FORMAT('0',10X,'THE CODE (WBSD) LISTED IN THE STATUS OUTPUT DEFINE
     1S THE FOLLOWING 0'//15X,'W      =  C   WIDE BAND SLAVED MODE NOT IN
     2 EFFECT'/21X,'=  S   IN EFFECT'//15X,'B      =  C   (BIT NOT BEING
     3USED YET)'/21X,'=  N   ENDO SCAN IN PROGRESS'/21X,'=  X   EXO SCAN
     4 IN PROGRESS'//15X,'S      =  0   (BIT NOT BEING USED YET)'/21X,'=
     5 M   MANUAL WBS SCAN                          '/21X,'=  A   AUTOMATIC WBS
     6SCAN         '//,15X,'D      =  0   DOUBLET MODE OFF  '/21X,
     7'=  D   DOUBLET MODE ON'/)
 2017 FORMAT('0',10X,'LAUNCH TIME (TOTAL SECS) = ',F10.3,5X,'IW117 = ',
     1I5///)
 3100 FORMAT('1BAND = ',A2)
 3200 FORMAT('0   TIME    HGHT  RANGE  RDOT     AZIM  ELEV  LC A/D  AZER
     1R  ELERR AGC PWP C      GMT       R.OFFST RANGE ANG MISC PRF R D  WB
     2SD  PRI')
 3300 FORMAT('    (SECS)   (KM)   (KM) (M/SEC)     DEG   DEG DBM CNT   DEG
     1    DEG   DB DPW   HR  M  SECS     (M)   ',5A1,1X,3A1,1X,2A1,A2,1X,
     2I3,1X,A1,1X,A2,1X,4A1,/)
 3400 FORMAT(' ',F9.3,A1,F5.1,F7.1,F8.1,F7.2,F6.2,2I4,2F7.3,F5.1,I3,1X,I
     11,3I3,'.',I3,1X,F7.1,1X,5A1,1X,3A1,1X,2A1,A2,1X,I3,1X,A1,1X,A2,1X,
     24A1,1X,I5)
 3600 FORMAT(' ',F9.3,A1,F5.1,F7.1,F8.1,F7.2,F6.2,2I4,2F7.3,F5.1,I3,1X,I
     11,3I3,'.',I3,1X,F7.1,29X,1X,I5)
C
      DATA ZLC/'LC  '/,ZRC/'RC  '/,ZWB/'WB  '/,ZNB/'NB  '/
      DATA        IFRST3/0/,IFRST4/0/,INTAV/1/,IFRST2/0/,IFRST5/0/
      DATA ER /6378.145/ ,IFRST1/0/,BLNKK/'    '/ ,ZBUSE/'    '/
      DATA IAST2/'****'/,IAST/'*   '/ ,IBLNK/'    '/
      DATA D1000/1000. D0/
C
C        ITST = 1   ARE NOT WITHIN THE NSTART-NSTOP INTERVAL
C        ITST = 2   ARE WITHIN THE NSTART-NSTOP INTERVAL
C        ITST = 3   AT NSTOP OF THE NSTART-NSTOP INTERVAL
C        NEWA = 0   MISSION FLOWN BEFORE 15 OCT 70 (OLD ATTN.)
C        NEWA = 1   MISSION FLOWN AFTER  15 OCT 70 (NEW ATTN.)
C
      READ(5,1)ILNCH,NVALS,IW117,IAUTO,TITL,(NSTART(I),NSTOP(I),NSKIP(I)
     1,I=1,NVALS)
    1 FORMAT(I10,3I5,1X,A4/(6I10))
C
      IF(NVALS.LE.0)NVALS=1
C
      IEOF=0
      IERR=0
      CALL READJS(INPUF,IEOF,IERR)
      IF(IEOF.EQ.1)GO TO 680
```

```
      ISIG=1
      CALL HEDADT (ISIG,INBUF(1),IEQM(1))
      NEWA=0
      IF(IYR.GT.70)GO TO 282
      IF(IYR.LT.70)GO TO 283
      IF(IMTH.GT.10)GO TO 282
      IF(IMTH.LT.10)GO TO 283
      IF(IDAY.LT.15)GO TO 283
  282 NEWA=1
  283 CONTINUE
      IF(NWBAN.EQ.0)IAUTO=1
      IERR=0
      CALL READJS(INBUF,IEOF,IERR)
      IF(IEOF.EQ.1)GO TO 680
C
C        STORE THE DESIRED CALIBRATION VALUES
C
      DO 21 K=1,255
   21 XFZLN(K)=XNBUF(K)
C
      N=0
      DO 20 K=256,383
      N=N+1
   20 XATBL(N)=XNBUF(K)
C
      N=0
      DO 22 K=512,527
      N=N+1
   22 PIFA(N)=XNBUF(K)
      N=0
      DO 23 K=528,543
      N=N+1
   23 OIFA(N)=XNBUF(K)
C
      PFSA=XNBUF(592)
      PSSA=XNBUF(593)
      OFSA=XNBUF(594)
      OSSA=XNBUF(595)
      AGAMA = XNBUF(596)
      EGAMA = XNBUF(597)
C
      ABIAS=XNBUF(602)
      EBIAS=XNBUF(603)
      DEGCON=(180.*.0479369)/3141.59
      AZBIAS=DEGCON*ABIAS
      ELBIAS=DEGCON*EBIAS
C
      DO 25 K=604,611
      N=N+1
      QBIAS(N)=XNBUF(K)
   25 RBIAS(N)=QBIAS(N)
C
      AZGRAD = XNBUF(612)
      ELGRAD = XNBUF(613)
C
      PWRCN=XNBUF(620)
```

```
      PWRSN=XN8UF(621)
      PWRCW=XN8UF(622)
      PWRSW=XN8UF(623)
C
      N=0
      DO 27 K=624,628
      N=N+1
   27 XKRCS(N)=XNBUF(K)
C
      PSSL=XNBUF(629)
      OSSL=XNBUF(630)
C
      N=0
      DO 28 K=631,644
      N=N+1
   28 DW(N)=XN8UF(K)
C
      CKCN=14.989625/2048.
      XLX634=DW(4)*CKCN
      XLX635=DW(5)*CKCN
      XLX640=DW(10)*CKCN
      XLX641=DW(11)*CKCN
C
      ISTAT1=0
      ISTAT2=0
      LCNT=0
      DO 280 J=1,21
      ISTAT(J)=IAST2
  280 CONTINUE
      JCON=-1
      INDEX=0
      ITST=1
      ITDEC=1
      IPOLAR=0
      ITCNT=0
      IPULS=0
C
      DO 120 IJ=1,NVALS
      NBEG=NSTART(IJ)
C
      IF(NSTART(IJ).LE.0)NSTART(IJ)=1
      IF(NSTOP (IJ).LE.0)NSTOP(IJ)=99999
      NNSET=NSKIP(IJ)+1
      NNSVE=NNSET
C
    3 JCON=JCON+1
      IF(JCON.EQ.9.OR.JCON.EQ.0)GO TO 97
      INDEX=(JCON-1)*900
      GO TO 99
   97 JCON=1
      INDEX=0
   98 IEOF=0
      IERR=0
      IPAR=IBLNK
      CALL READJS(INBUF,IEOF,IERR)
      IF(IERR.EQ.1)IPAR=IAST
      IF(IEOF.EQ.1)GO TO 680
```

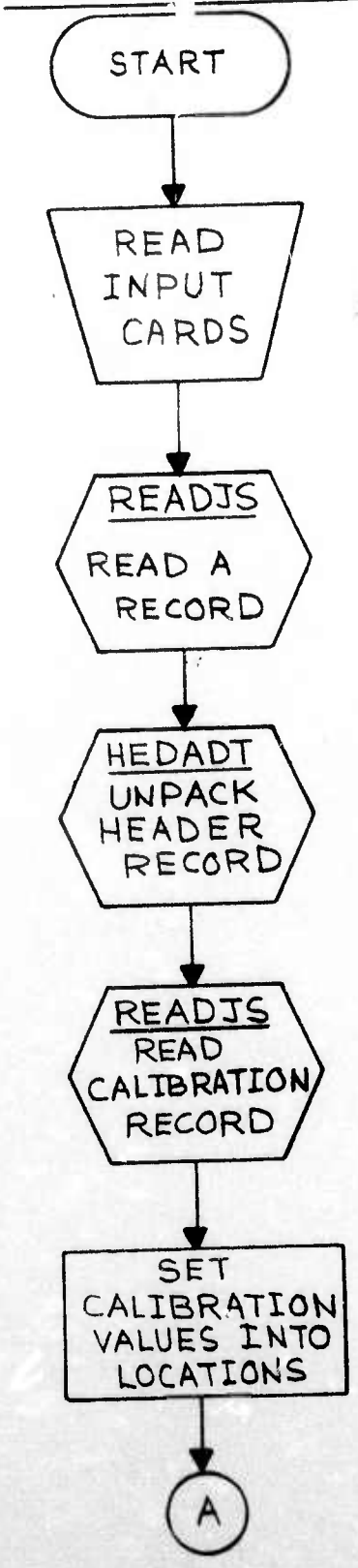
```
   99 IALSW=0
C
      CALL UNPACK
      IF(IAUTO.EQ.1)GO TO 100
      NNSET=NNSVE
      IF(I27385.NE.0.OR.I27388.NE.0)NNSET=1
  100 CONTINUE
C
      IF(IFRST2.EQ.1)GO TO 92
      PWRUS1=PWRCN
      IF(NWBAN.EQ.1)PWRUS1=PWRCW
      PWRUS2=PWRSN
      IF(NWBAN.EQ.1)PWRUS2=PWRSW
      ZBUSE=ZNB
      IF(NWBAN.EQ.1)ZBUSE=ZWB
      RRUSE=-.00943
      IF(NWBAN .EQ.1)RRUSE=-.000015
C
      WRITE(6,200)ZBUSE,ITAPEN    ,TITL,(IEQM(I),I=4,6)
  200 FORMAT('1ALERT-ALCOR'              4X,'BAND = ',A2,4X,'REEL NO. = '
     1,I5,'   TITLE = ',A4,'   DATE = ',I2,'/',I2,'/',I2)
      WRITE(6,212)(NSTART(I),NSTOP(I),NSKIP(I),I=1,NVALS)
  212 FORMAT('0 START   STOP   SKIP',12X,'START   STOP   SKIP',12X,'STAR
     1T   STOP   SKIP',12X,'START   STOP   SKIP' /( 4(2X,I5,2X,I5,2X,
     2I5,10X)))
      TLNCH=DFLOAT(ILNCH)/D1C0C
      WRITE(6,2017)TLNCH,IW117
      WRITE(6,7431)DW(1),DW(7),DW(2),DW(8),DW(3),DW(9),
     1XLX634,XLX640,XLX635,XLX641,DW(6),DW(12),DW(13),DW(14)
 7431 FORMAT('0',10X,'EXO-ATMOSPHERIC',38X,'ENDO-ATMOSPHERIC SCAN'// .
     115X,'UPPER WBS SCAN ALTITUDE (KM) = ',F10.2,17X,'UPPER WBS SCAN AL
     2TITUDE (KM) = ',F10.2/
     315X,'LOWER WBS SCAN ALTITUDE (KM) = ',F10.2,17X,'LOWER WBS SCAN AL
     4TITUDE (KM) = ',F10.2/
     515X,'NUMBER OF DWELLS PER SCAN    = ',F10.0,17X,'NUMBER OF DWELLS
     6PER SCAN    = ',F10.0/
     715X,'INITIAL RANGE OFFSET (M)     = ',F10.2,17X,'INITIAL RANGE OFF
     8SET (M)     = ',F10.2/
     915X,'RANGE OFFSET INCREMENT (M)   = ',F10.2,17X,'RANGE OFFSET INCR
     AEMENT (M)   = ',F10.2/
     B15X,'NO.OF SLAVED PRIS PER DWELL  = ',F10.0,17X,'NO.OF SLAVED PRIS
     C PER DWELL  = ',F10.0//
     B11X,'UPPER DOUBLET MODE ALTITUDE (KM) = ',F10.2 ,
     C13X,'LOWER DOUBLET MODE ALTITUDE (KM) = ',F10.2)
      WRITE(6,8149)
 8149 FORMAT(///)
      WRITE(6,2008)
      WRITE(6,2004)
      WRITE(6,2005)
      WRITE(6,2006)
      WRITE(6,2007)
      WRITE(6,2009)
      WRITE(6,3100)ZBUSE
      WRITE(6,3200)
      WRITE(6,3300)(ISTAT(J),J=1,18)
C
      IFRST2=1
```

```
   92 CONTINUE
      IF(NUMPRI.LT.NSTART(IJ).OR.NUMPRI.GT.NSTOP(IJ))GO TO 3
C
      ITOT=(3600*IHRS+60*IMIN+ISEC)*1000+IMSEC
      ITAL=ITOT-ILNCH
      TAL=DFLOAT(ITAL)/D1000
      DO 710 K=1,18
  710 IOLDS(K)=ISTAT(K)
      CALL STATUS
C
      IF(IFRST4.EQ.0)GO TO 10
      IPULS=IPULS+1
      IF(IPULS.GE.NNSET)GO TO 87
      IF(ISTSW.EQ.0)GO TO 118
      WRITE(6,90)TAL,IPAR,(ISTAT(I),I=1,18),NUMPRI
   90 FORMAT(' ',F9.3,A1,87X,5A1,1X,3A1,1X,2A1,A2,1X,I3,1X,A1,1X,A2,1X,
     14A1,1X,I5)
      LCNT=LCNT+1
      GO TO 118
C
   87 IPULS=0
      GO TO 11
   10 IFRST4=1
   11 IADOUT=IR854-1
      IF(IW117.EQ.1)IADOUT=IMOVP
      IF(ICODE.EQ.5)XOPAGC=XPPAGC
      IF(ICODE.EQ.7)XOPAGC=XPPAGC
      RDOT=(IRDOT/(8192.0))*14.989625
      RANGE=(FLOAT(IPANGE)/2048000.)*14.989625+TRBIAS*.14989625
      TTCOR=    (RANGE/299776.)*(RDOT/1000.)
      RANGE=RANGE+TTCOR
      RRCOR=RRUSE*RDOT
      RANGE=RANGE+RRCOR/1000.
      APPOP=((IPPRCS/255.0)*80.0)-40.0
      IPPRCS=APPOP
      APPOP=((IOPRCS/255.0)*80.0)-40.0
      IOPRCS=APPOP
      AZ=(IAZ*2*3141.59265358)/(2.0**17)
      XAZ=AZ*.057295
      XAZ=XAZ+AZBIAS
      EL=(IEL*2*3141.59265358)/(2.0**17)
      XEL=EL*.057295
      XEL=XEL+ELBIAS
      CALL REFC(XEL,RANGE,ECORF,RCORF)
      RNGF=RANGE-RCORF
      ELVF=XEL-ECORF
      RADEL=ELVF*.017453
      CALT=SQRT(RNGF**2+ER*ER+2.*RNGF*ER*SIN(RADEL))-ER
      RANGE=RNGF
      EL=ELVF
      AZ=XAZ
      XPKPWR=IPKPWR
      IF(IPKPWR.LE.0)GO TO 39
      POWERT=PWRUS1+PWRUS2*ALOG10(XPKPWR)
      IPKPWR=POWERT
   39 CONTINUE
      XOFFST=(FLOAT(IOFFST)/2048.)*14.989625
```

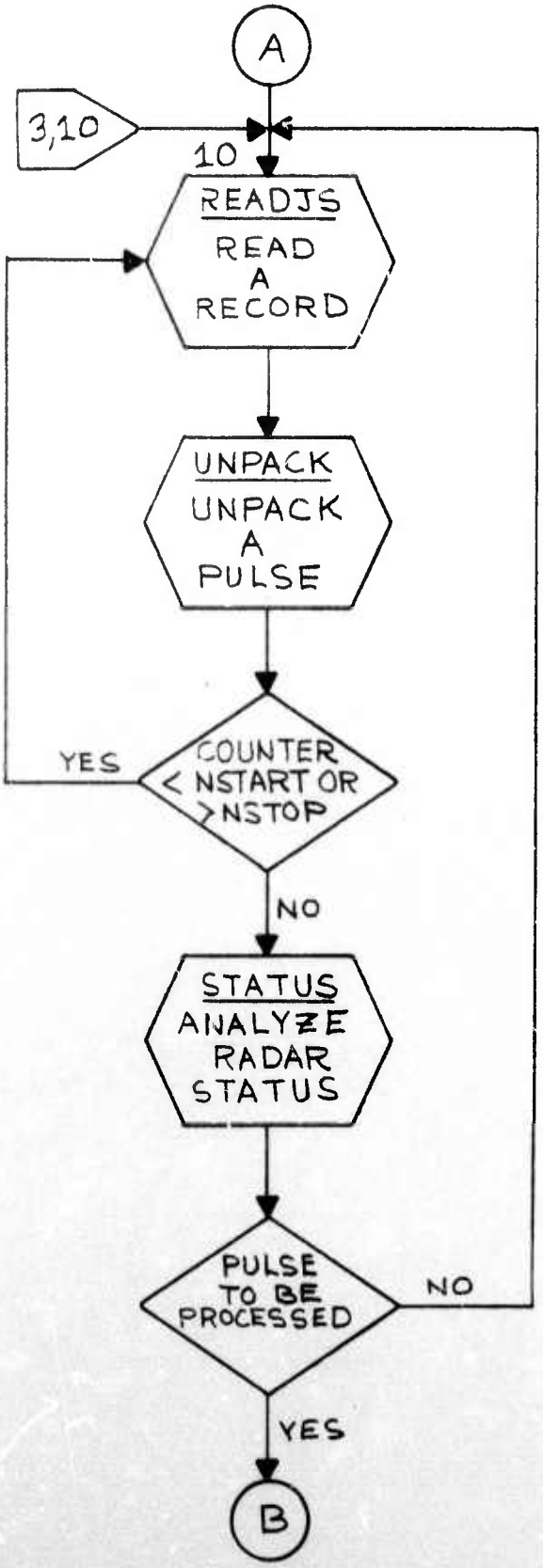
```
C
      IF(I241B1.GT.127)GO TO 6310
      I241B1=I241B1+128
      GO TO 6311
 6310 CONTINUE
      IF(I241B1.LT.129)GO TO 6311
      I241B1=256-I241B1
 6311 CONTINUE
      IF(I241B2.GT.127)GO TO 6312
      I241B2=I241B2+128
      GO TO 6313
 6312 CONTINUE
      IF(I241B2.LT.129)GO TO 6313
      I241B2=256-I241B2
 6313 CONTINUE
      IF(I241B3.GT.127)GO TO 6314
      I241B3=I241B3+128
      GO TO 6315
 6314 CONTINUE
      IF(I241B3.LT.129)GO TO 6315
      I241B3=256-I241B3
 6315 CONTINUE
C
      Z1=XFZLN(I241B2)-XFZLN(I241B1)+AGAMA
      COSTA=COS(Z1)
      P=XATBL(I240B2)-XATBL(I240B1)
      AZERR=AZGRAD*2.*3.141593*(10.**(P/20.))*COSTA
      AZERR=AZERR*57.2958
C
      Z2=XFZLN(I241B3)-XFZLN(I241B1)+EGAMA
      COSTE=COS(Z2)
      P=XATBL(I240B3)-XATBL(I240B1)
      ELERR=ELGRAD*2.*3.141593*(10.**(P/20.))*COSTE
      ELERR=ELERR*57.2958
C
      LCNT=LCNT+1
      IF(LCNT.LT.54)GO TO 689
      WRITE(6,3100)ZPUSE
      WRITE(6,3200)
      WRITE(6,3300)      (IOLDS(J),J=1,18)
      LCNT=0
  689 CONTINUE
  657 CONTINUE
      IF(ISTSW.EQ.0)GO TO 645
      WRITE(6,3400)TAL,IPAR,CALT,RANGE,RDOT,AZ,EL,IPPRCS,IADCUT,AZERR,
     1ELERR,XPPAGC,IPKPWR,ICODE,IHRS,IMIN,ISEC,IMSEC,XOFFST,
     1(ISTAT(J),J=1,18),NUMPRI
      GO TO 650
  645 WRITE(6,3600)TAL,IPAR,CALT,RANGE,RDOT,AZ,EL,IPPRCS,IADCUT,AZERR,
     1ELERR,XPPAGC,IPKPWR,ICODE,IHRS,IMIN,ISEC,IMSEC,XOFFST,NUMPRI
  650 CONTINUE
C
  118 IF(NUMPRI.LT.NSTOP(IJ))GO TO 3
      IFRST4=0
      IPULS=0
      IFRST1=0
  119 IFRST3=0
C
  120 CONTINUE
C
      GO TO 125
  680 WRITE(6,109)NUMPRI
  109 FORMAT(' END OF FILE REACHED LAST NUMPRI VALUE = ',I10)
  125 RETURN
      END
```

APPENDIX D

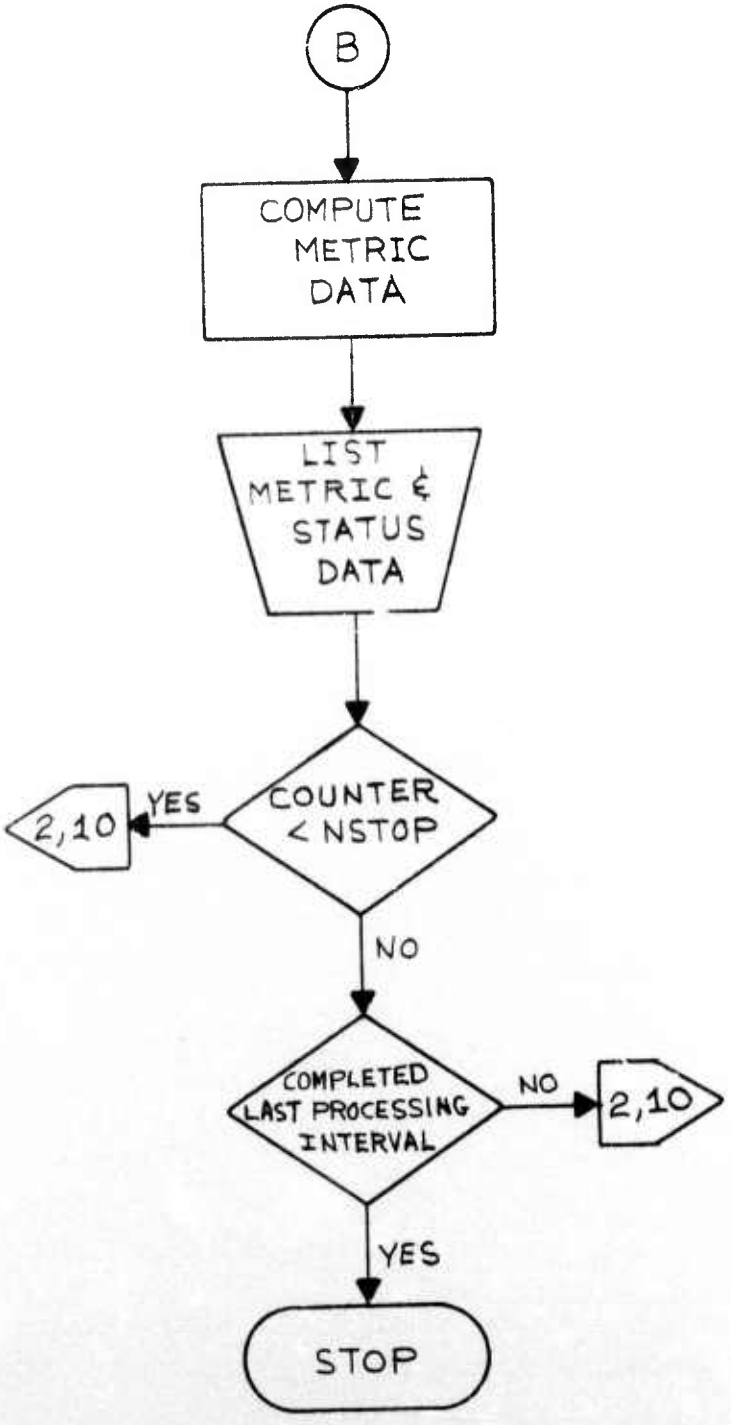
ALERT FLOW DIAGRAM



APPENDIX D-2


A
3,10
10
READJS
READ
A
RECORD
UNPACK
UNPACK
A
PULSE
YES
COUNTER
< NSTART OR
> NSTOP
NO
STATUS
ANALYZE
RADAR
STATUS
PULSE
TO BE
PROCESSED
NO
YES
B

APPENDIX D-3


B
COMPUTE METRIC DATA
LIST METRIC & STATUS DATA
COUNTER < NSTOP
YES
2,10
NO
COMPLETED LAST PROCESSING INTERVAL
NO
2,10
YES
STOP

APPENDIX E
SUBROUTINE HEDADT PROGRAM LISTING

```
*              CALL HEDADT (ISIG,INBUF,IEQU)
*              ISIG = 1     UNPACK THE 20 WORD ADT HEADER
          START
          ENTRY HEDADT
          SPACE
XISIG     EQU   4
XICAL     EQU   5
XIEQU     EQU   6
BASE      EQU   12
          SPACE
HEDADT    SAVE  (14,12),T,*
          BALR  12,0
          USING *,BASE
          ST    13,SAVEA+4
          LA    7,SAVEA
          ST    7,8(0,13)
          LR    13,7
          SPACE
          LM    XISIG,XIEQU,0(1)
          SPACE
          L     8,0(XICAL)
          ST    8,TEMP1
          ST    8,TEMP2
          SRL   8,31
          ST    8,0(XIEQU)     MBAND
          L     8,TEMP1
          SLL   8,1
          SRL   8,25
          ST    8,4(XIEQU)     MREEL
          SPACE
          L     8,4(XICAL)
          ST    8,TEMP1
          ST    8,TEMP2
          SRL   8,16
          ST    8,8(XIEQU)     MHTR
          L     9,TEMP1
          SLL   8,16
          SRL   8,24
          ST    8,12(XIEQU)    MMNTH
          L     8,TEMP2
          SLL   8,24
          SRL   8,24
          ST    8,16(XIEQU)    MDAY
          SPACE
          SR    8,8
          IC    8,8(XICAL)
          ST    8,20(XIEQU)    MYEAR
          MVC   24(9,XIEQU),9(XICAL)    MISSION DES.
          SPACE
RETURN    L     13,SAVEA+4
          RETURN (14,12),T
          CNOP  0,4
TEMP1     DC    F'0'
TEMP2     DC    F'0'
SAVEA     DC    18A(*)
          END
```

APPENDIX F
SUBROUTINE UNPACK PROGRAM LISTING

```
         CSECT
         ENTRY UNPACK
UNPACK   SAVEL
         DROP  15
         CNOP  0,4
         BALR  2,0
         USING START,2,3
START    L     3,BASA
         L     4,DUBUF
         L     5,DUBUF
         L     6,DU8UF
         A     5,=F'4096'
         A     6,=F'8192'
         USING DBUF,4,5,6
         B     START1
DU8UF    DC    V(ICOM)
BASA     DC    A(START+4096)
START1   L     8,=F'1'
         ST    8,IALSW
         LA    8,IN8UF  NUMPRI=8*(NPR-1)+JCON
         MVC   TEMP(3),0(8)
         MVC   TEMP2(3),0(8)
         L     9,TEMP
         SLL   9,8
         SRL   9,16
         S     9,ONE
         SR    8,8
         M     8,EIGHT
         A     9,JCON
         ST    9,NUMPRI
         L     9,NBEG
         C     9,NUMPRI
         BH    CDELTAR
         SPACE
         LA    8,WD233  COMPUTE GMT
         A     8,INDEX
         MVC   TEMP(3),0(8)
         L     9,TEMP
         N     9,=X'1FC00000'
         SRL   9,24
         ST    9,IHRS                    STORE HRS
         L     9,TEMP
         N     9,=X'003FC000'
         SRA   9,16
         ST    9,IMIN                    STORE MINS
         L     9,TEMP
         N     9,=X'00003F00'
         SRA   9,8
         ST    9,ISEC                    STORE SECS
         LA    8,WD234
         A     8,INDEX
         MVC   TEMP(3),0(8)
         L     9,TEMP
         N     9,=X'7FE00000'
         SRL   9,21
         ST    9,IMSEC                   STORE MSEC
         SPACE
```

```
GOODI    LA     8,WD237
         A      8,INDEX
         MVC    TEMP(3),0(8)
         L      9,TEMP
         N      9,=X'7FFFC000'
         SRL    9,14
         ST     9,IAZ                    STORE AZ
         LA     8,WD236
         A      8,INDEX
         MVC    TEMP(3),0(8)
         L      9,TEMP
         N      9,=X'7FFFC000'
         SRL    9,14
         ST     9,IEL                    STORE ELEV
         LA     8,WD268
         A      8,INDEX
         MVC    TEMP(3),0(8)
         L      9,TEMP
         N      9,=X'FF000000'
         SRL    9,24
         ST     9,IPPRCS                 STORE PP CBSM
GOCCN    LA     8,WD265
         A      8,INDEX
         MVC    TEMP(3),0(8)
         L      9,TEMP
         N      9,=X'FFFFE000'
         SRL    9,13
         ST     9,TEMP2
         LA     8,WD267
         A      8,INDEX
         MVC    TEMP(3),0(8)
         L      9,TEMP
         N      9,=X'FFFF0000'
         SRL    9,16
         A      9,TEMP2
         SLL    9,11
         ST     9,TEMP2
         LA     8,WD266
         A      8,INDEX
         MVC    TEMP(3),0(8)
         L      9,TEMP
         N      9,=X'FFE00000'
         SRL    9,21
         A      9,TEMP2
         ST     9,IRANGE                 STORE RANGE
         LA     8,WD115
         A      8,INDEX
         MVC    TEMP(3),0(8)
         L      9,TEMP
         N      9,=X'00FFC000'
         SRA    9,16
         ST     9,IPKPWR                 STORE PEAK POWER
         LA     8,WD269
         A      8,INDEX
         MVC    TEMP(3),0(8)
         L      9,TEMP
         C      9,=F'0'
```

```
         BNL   DCTG1
         N     9,=X'7FFFFFC0'
         SRA   9,8
         LCR   9,9
         B     DCTG2
DCTG1    SRA   9,8
DCTG2    ST    9,IRDCT                  STORE R-DCT
         LA    8,WD18
         A     8,INDEX
         MVC   TEMP(3),0(8)
         L     9,TEMP
         N     9,=X'7FC00C00'
         SRL   9,24
         LA    9,1(9)
         ST    9,IR854            A/D COUNT-R8 52
         LA    8,WD268
         A     8,INDEX
         MVC   TEMP(3),0(8)
         L     9,TEMP
         N     9,=X'00FFC0C0'
         SRL   9,16
         ST    9,ICPRCS                 STORE OP C8SM
         SPACE
         LA    8,WD117
         A     8,INDEX
         MVC   TEMP(3),0(8)
         L     9,TEMP
         N     9,=X'FFC00C00'
         SRL   9,24
         ST    9,IMOVP                  ARE PRIMARY AND OFFSET MOVING
         SPACE
         L     9,TEMP
         N     9,=X'00C0FF00'
         SRL   9,8
         ST    9,IMOVO                  IS OFFSET WINDOW MOVING
         SPACE
         LA    8,WD273
         A     8,INDEX
         MVC   TEMP(3),0(8)
         L     9,TEMP
         N     9,=X'F0C0C000'
         SRL   9,28
         ST    9,ICODE                  COMPUTE THE CODE FOR PRI
         SPACE
         L     9,TEMP
         N     9,=X'08C00000'
         SRL   9,27
         ST    9,I273B5                 WBS MODE INDICATOR
         L     9,TEMP
         N     9,=X'04C00C00'
         SRL   9,26
         ST    9,I273B6                 ENDO-EXO SCAN INDICATOR
         L     9,TEMP
         N     9,=X'02CCCCC0'
         SRL   9,25
         ST    9,I273B7                 WBS SCAN MODE INDICATOR
         L     9,TEMP
```

```
         N      9,=X'01C00000'
         SRL    9,24
         ST     9,I27388                DOUBLET MODE INDICATOR
         SPACE
         SR     9,9
         ST     9,ICFFST
         L      9,ICODE
         C      9,THREE
         BE     OFFCOM
         C      9,SEVEN
         BE     OFFCOM
         B      OFFSKP
         SPACE
OFFCOM   LA     8,WD278
         A      8,INDEX
         MVC    TEMP(3),0(8)
         SR     9,9
         L      9,TEM
         C      9,ZERO
         BNL    RPLUS
         N      9,=X'7FFFFF00'
         SRA    9,8
         LCR    9,9
         B      RNEG
RPLUS    SRA    9,8
RNEG     ST     9,ICFFST                RANGE OFFSET FOR SLAVED WINDOW
         SPACE
OFFSKP   LA     8,WD240
         A      8,INDEX
         MVC    TEMP(3),0(8)
         L      9,TEMP
         N      9,=X'7FC00000'
         SRL    9,24
         LA     9,1(9)
         ST     9,I24081
         L      9,TEMP
         N      9,=X'007F0000'
         SRL    9,16
         LA     9,1(9)
         ST     9,I24082
         L      9,TEMP
         N      9,=X'00C07F00'
         SRL    9,8
         LA     9,1(9)
         ST     9,I24083
         LA     8,WD241
         A      8,INDEX
         MVC    TEMP(3),0(8)
         L      9,TEMP
         N      9,=X'FFC00000'
         SRL    9,24
         LA     9,1(9)
         ST     9,I24181
         L      9,TEMP
         N      9,=X'00FF0000'
         SRL    9,16
         LA     9,1(9)
```

```
                ST      9,I24182
                L       9,TEMP
                N       9,=X'0CC0FFC0'
                SRL     9,8
                LA      9,I(9)
                ST      9,I24183
                LA      8,WD263
                A       8,INDEX
                MVC     TEMP(3),0(8)
                L       9,TEMP
                N       9,=X'FCC0CC00'
                SRL     9,20
                LA      11,PIFA
                LE      0,0(9,11)               GET VALUE FROM PIFA TABLE
                STE     0,XPPAGC
                L       9,TEMP
                N       9,=X'0F000000'
                SRL     9,22
                LA      11,QIFA
                LE      0,0(9,11)               GET VALUE FROM QIFA TABLE
                STE     0,XQPAGC
                L       9,ZERO
                ST      9,ISWSSP
                ST      9,ISWSSC
                ST      9,ISSERR
                LA      8,WD239
                A       8,INDEX
                MVC     TEMP(3),0(8)
                L       9,TEMP
                N       9,=X'00C0C200'          CHECK BIT 23 (PFSA)
                C       9,ZERO
                BE      CKFSCP
                LE      0,PFSA
                AE      0,XPPAGC
                STE     0,XPPAGC                ADD IN PFSA VALUE
CKFSCP          L       9,TEMP
                N       9,=X'00CC0100'          CHECK BIT 24 (QFSA)
                C       9,ZERO
                BE      CKSSPP
                LE      0,QFSA
                AE      0,XQPAGC
                STE     0,XQPAGC                ADD IN QFSA VALUE
CKSSPP          L       11,TEMP
                N       11,=X'00802000'
                C       11,=F'0'
                BNE     CKSSCP
INDET           L       8,ONE                   INDETERMINATE SITUATION
                ST      8,ISSERR
                B       CDELTAR
CKSSCP          L       11,TEMP
                N       11,=X'00401000'
                C       11,=F'0'
                BE      INDET
PPTEST          LA      9,WD239
                A       9,INDEX
                MVC     TEMP(3),0(9)
                L       10,TEMP                 AUX.MICR.WORD INTO REG.10
                LA      9,WD252                 AUX.MICROWAVE WORD INTO REG.11
```

```
         A     9,INDEX
         MVC   TEMP(3),0(9)          RANGE TR.WORD INTO TEMP
         N     10,=X'0C8C2C00'
         C     10,=X'0C8C0000'
         BNE   S74                   BIT 9 = 0 (COND.A)
         LE    0,PSSL                ADD IN PSSL (COND.B)
         AE    0,XPPAGC
         STE   0,XPPAGC
         L     9,ONE
         ST    9,ISWSSP
S74      L     8,NEWA                OLD OR NEW ATTEN.
         C     8,ZERO
         BE    OPTEST
         L     9,TEMP
         N     9,=X'00C8CC00'
         C     9,=F'0'
         BE    RDBKLC                ATTENUATOR READBACK
         N     11,=X'080CC000'       S74 ARMED
         C     11,ZERO               STATUS READ BACK
         BNE   SLC
NOATTLC  LE    0,PREVLC
         STE   0,XPPAGC
         MVC   JSWLC(4),ONE
         MVC   ISSERR(4),ONE
         B     OPTEST
RDBKLC   N     11,=X'040CCC0C'       S74 NOT ARMED
         C     11,ZERO                STATUS READBACK
         BE    NOATTLC
         B     OPTEST
SLC      LE    0,PSSA
         AE    0,XPPAGC              ADD IN PSSA (COND.B)
STORLC   STE   0,XPPAGC
         MVC   ISWSSP(4),ONE
OPTEST   LA    9,WD239
         A     9,INDEX
         MVC   TEMP(3),0(9)
         L     10,TEMP               AUX.MICR.WORD INTO REG.10
         LA    9,WD252               AUX.MICROWAVE WORD INTO REG.11
         A     9,INDEX
         MVC   TEMP(3),0(9)
         L     11,TEMP
         LA    9,WD272
         A     9,INDEX
         MVC   TEMP(3),0(9)          RANGE TR.WORD INTO TEMP
         N     10,=X'0040C000'
         C     10,=X'0040C00C'
         BNE   S75                   BIT 10 = 0 (COND.A)
      LE       0,OSSL                ADD IN OSSL (COND.B)
         AE    0,XOPAGC
         STE   0,XOPAGC
         L     9,ONE
         ST    9,ISWSSC
```

```
S75       L     8,NEWA                    OLD OR NEW ATTEN.
          C     8,ZERO
          BE    OUT1
          L     9,TEMP
          N     9,=X'00040000'
          C     9,=F'0'
          BE    RDBKRC                    ATTENUATOR READBACK
          N     11,=X'02000000'           S75 ARMED
          C     11,ZERO                   STATUS READ BACK
          BNE   SRC
NOATTRC   LE    0,PREVRC
          STE   0,XOPAGC
          MVC   JSWRC(4),ONE
          MVC   ISSERR(4),ONE
          B     OUT1
RDBKRC    N     11,=X'0 0000000'          S75 NOT ARMED
          C     11,ZERO                    STATUS READBACK
          BE    NOATTRC
          B     OUT1
SRC       LE    0,OSSA
          AE    0,XOPAGC                  ADD IN OSSA (COND.B)
STORCC    STE   0,XOPAGC
          MVC   ISWSSP(4),ONE
OUT1      L     9,JSWLC
          C     9,ZERO
          BNE   OUT2
          LE    0,XPPAGC
          SE    0,=E'16'
          STE   0,XPPAGC
          STE   0,PREVLC
OUT2      L     9,JSWRC
          C     9,ZERO
          BNE   ENDALERT
          LE    0,XOPAGC
          SE    0,=E'16'
          STE   0,XOPAGC
          STE   0,PREVRC
ENDALERT  MVC   JSWLC(4),ZERO
          MVC   JSWRC(4),ZERO
          LA    8,INBUF
          MVC   TEMP(3),0(8)
          L     9,TEMP
          SRL   9,31
          C     9,ZERO
          BE    NBAND
          LE    2,RBIAS+16                WIDE BAND TAPE
          STE   2,TRBIAS
LCPOLAR   L     9,ISWSSP
          C     9,ONE
          BNE   CCELTAR
          LE    2,RBIAS+24
          AE    2,TRBIAS                  ADD IN PSSA-RBIAS(7)
          STE   2,TRBIAS
          B     CCELTAR
NBAND     LE    2,RBIAS                   NARROW BAND
          STE   2,TRBIAS
          LA    8,WD273                   CENTER OR EDGE TRACK
```

```
         A      8,INDEX
         MVC    TEMP(3),0(8)
         L      9,TEMP
         N      9,=X'00C10000'
         C      9,ZERO
         BNE    CKNBEDGE                EDGE TRACKING
         B      CDELTAR
CKNBEDGE L      8,IRDOT                 CHECK SIGN OF R DOT
         C      8,ZERO
         BH     CKNBLOW
         LE     2,RBIAS+4               LEADING EDGE BIAS
         AE     2,TRBIAS
         STE    2,TRBIAS
         B      CDELTAR
CKNBLOW  LE     2,RBIAS+8               TRAILING EDGE BIAS
         AE     2,TRBIAS
         STE    2,TRBIAS
CDELTAR  RETL
TEMP     DC     F'0'
TEMP2    DC     F'0'
IXC      DC     F'0'
PRINUM   DC     F'0'
IPASS    DC     F'0'
ISWSSO   DC     F'0'
ISWSSP   DC     F'0'
JSWLC    DC     F'0'
JSWRC    DC     F'0'
PREVLC   DC     E'0.0'
PREVRC   DC     E'0.0'
ZERO     DC     F'0'
ONE      DC     F'1'
TWO      DC     F'2'
THREE    DC     F'3'
FOUR     DC     F'4'
SEVEN    DC     F'7'
EIGHT    DC     F'8'
C10      DC     F'10'
C100     DC     F'100'
C1000    DC     F'1000'
DBUF     DSECT
INBUF    DS     CL3
WD1      DS     CL3          PP LOG D.
         DS     CL48
WD18     DS     CL3
WD19     DS     CL3
         DS     CL27
WD29     DS     CL3
WD30     DS     CL3
         DS     CL81
WD58     DS     CL171        PP PHASE D.
WD115    DS     CL3
WD116    DS     CL3
WD117    DS     CL3
WD118    DS     CL171        CP LOG D.
WD175    DS     CL171        CP PHASE D.
WD232    DS     CL3
WD233    DS     CL3
```

```
wD234    DS    CL3
         DS    CL3
wD236    DS    CL3
wD237    DS    CL3
         DS    CL3
wD239    DS    CL3
wD240    DS    CL3
wD241    DS    CL3
wD242    DS    CL3
         DS    CL27
wD252    DS    CL3
wD253    DS    CL3
         DS    CL27
wD263    DS    CL3
wD264    DS    CL3
wD265    DS    CL3
wD266    DS    CL3
wD267    DS    CL3
wD268    DS    CL3
wD269    DS    CL3
wD270    DS    CL3
wD271    DS    CL3
wD272    DS    CL3
wD273    DS    CL3
wD274    DS    CL3
wD275    DS    CL3
wD276    DS    CL3
wD277    DS    CL3
wD278    DS    CL3
wD279    DS    CL3
wD280    DS    CL3
         DS    CL6369
IAZ      DS    1F
IEL      DS    1F
INDEX    DS    1F
IPPRCS   DS    1F
IORS     DS    1F
IRANGE   DS    1F
IPKPWR   DS    1F
IRDOT    DS    1F
IALT     DS    1F
INDAZ    DS    1F
JNDAZ    DS    1F
INDEL    DS    1F
IRB54    DS    1F
IRB85    DS    1F
IOPRCS   DS    1F
I240B1   DS    1F
I240B2   DS    1F
I240B3   DS    1F
I241B1   DS    1F
I241B2   DS    1F
I241B3   DS    1F
XPPAGC   DS    1F
IBETA    DS    1F
NEWA     DS    1F
BAND     DS    1F
```

```
NSW       DS    1F
RBIAS     DS    8F
ISVPRI    DS    1F
IHRS      DS    1F
IMIN      DS    1F
ISEC      DS    1F
IMSEC     DS    1F
STAT      DS    21F
TRBIAS    DS    1F
ISTAT1    DS    1F
ISTAT2    DS    1F
ISTAT3    DS    1F
ISTAT4    DS    1F
IALSW     DS    1F
ISTSW     DS    1F
NBWB      DS    1F
ISIGND    DS    1F
IIISB2    DS    1F
JCON      DS    F
NBEG      DS    F
NEND      DS    F
ITST      DS    F
NUMPRI    DS    F
XOPAGC    DS    F
ITBAND    DS    F
ITAPNO    DS    F
IPRF      DS    F
IPCLAR    DS    F
ISSERR    DS    F
PIFA      DS    16F
CIFA      DS    16F
PFSA      DS    1F
CFSA      DS    1F
PSSA      DS    1F
CSSA      DS    1F
PSSL      DS    1F
CSSL      DS    1F
ICODE     DS    F
I273B5    DS    F
I273B6    DS    F
I273B7    DS    F
I273B8    DS    F
IMOVP     DS    F
IMCVC     DS    F
IOFFST    DS    F
          END
```

APPENDIX G

SUBROUTINE REFC PROGRAM LISTING

```
      SUBROUTINE REFC(E,R,DEE,DRR)                VERSION 6/16/70
      DIMENSION DE(16,8),DR(16,8),ED(16),RD(8)
      DATA DE/0.0    ,0.0    ,0.0    ,0.0    ,0.0    ,0.0    ,0.0    ,0.0    ,
     10.0    ,0.0    ,0.0    ,0.0    ,0.0    ,0.0    ,0.0    ,0.0    ,0.0313,
     20.0303,0.0292,0.0287,0.0282,0.0272,0.0262,0.0253,0.0243,0.0223,
     30.0214,0.0195,0.0171,0.0135,0.0075,0.0    ,0.0937,0.0848,0.0770,
     40.0732,0.0694,0.0627,0.0571,0.0522,0.0480,0.0412,0.0385,0.0337,
     50.0278,0.0205,0.0105,0.0    ,0.1850,0.1520,0.1250,0.1140,0.1050,
     60.0904,0.0795,0.0708,0.0636,0.0523,0.0478,0.0405,0.0323,0.0229,
     70.0114,0.0    ,0.5310,0.3070,0.2120,0.1830,0.1600,0.1280,0.1060,
     80.0899,0.0780,0.0612,0.0550,0.0455,0.0354,0.0246,0.0120,0.0    ,
     90.7550,0.3720,0.2400,0.2020,0.1750,0.1370,0.1120,0.0942,0.0811,
     A0.0631,0.0566,0.0466,0.0361,0.0250,0.0122,0.0    ,0.9120,0.4110,
     80.2560,0.2140,0.1840,0.1420,0.1150,0.0967,0.0830,0.0643,0.0575,
     C0.0472,0.0365,0.0252,0.0122,0.0    ,0.9700,0.4200,0.2600,0.2200,
     D0.1900,0.1460,0.1170,0.0980,0.0840,0.0653,0.0584,0.0478,0.0369,
     E0.0254,0.0123,0.0 /
      DATA DR/  0.0,  0.0,  0.0,  0.0,  0.0,  0.0,  0.0,  0.0,  0.0,
     1  0.0,  0.0,  0.0,  0.0,  0.0,  0.0,  0.0, 22.6, 21.5, 20.4, 19.9,
     2 19.4, 18.5, 17.6, 16.8, 16.1, 14.8, 14.2, 13.2, 12.0, 10.4,  8.6,
     3  7.7, 67.3, 57.9, 50.2, 47.0, 44.1, 39.3, 35.4, 32.1, 29.3, 24.8,
     4 22.9, 19.7, 16.3, 12.7,  9.4,  8.1,130.0, 98.5, 77.4, 69.7, 63.2,
     5 52.9, 44.7, 38.4, 33.4, 26.4, 23.9, 20.1, 16.4, 12.7,  9.4,  8.1,
     6340.0,167.0,103.0, 86.1, 73.4, 56.7, 46.2, 38.9, 33.6, 26.4, 24.0,
     7 20.2, 16.4, 12.8,  9.5,  8.2,405.0,170.0,104.0, 86.3, 73.6, 56.8,
     8 46.3, 38.9, 33.7, 26.5, 24.1, 20.3, 16.5, 12.8,  9.5,  8.2,421.0,
     9171.0,104.0, 86.6, 73.9, 57.1, 46.4, 39.0, 33.8, 26.8, 24.3, 20.5,
     A 16.6, 13.0,  9.8,  8.4,446.0,172.0,105.0, 87.4, 74.0, 58.0, 46.6,
     8 39.2, 34.0, 27.0, 24.6, 20.7, 16.7, 13.0, 10.0,  8.4/
      DATA ED,RTDED/0.01,2.0,4.0,5.0,6.0,8.0,10.0,12.0,14.0,18.,20.,
     124.,30.,40.,60.,90.,57.29578/
      DATA RD/0.01,10.,30.,60.,200.,400.,1000.,2000./
      IF(R.LE.0.0)GO TO 300
      RG=R/1.852D+00
      DO 100 IEO=2,15
      I=17-IEO
      IF(E.GE.ED(I))GO TO 120
  100 CONTINUE
      I=1
  120 DO 200 JRO=2,8
      J=10-JRO
      IF(RG.GE.RD(J))GO TO 220
  200 CONTINUE
      J=1
  220 IF(J.EQ.8)GO TO 340
      ZR=ALOG(RG/RD(J))/ALOG(RD(J+1)/RD(J))
      IF(E.LE.0.0)GO TO 320
      ZE=ALOG(E/ED(I))/ALOG(ED(I+1)/ED(I))
      DE1=((DE(I+1,J)-DE(I,J))*(1.-ZR)+(DE(I,J+1)-DE(I,J))*ZR)*ZE
      DE2=((DE(I,J+1)-DE(I,J))*(1.-ZE)+(DE(I+1,J+1)-DE(I,J+1))*ZE)*ZR
      DEE=DE1+DE2+DE(I,J)
      DR1=((DR(I+1,J)-DR(I,J))*(1.-ZR)+(DR(I,J+1)-DR(I,J))*ZR)*ZE
      DR2=((DR(I,J+1)-DR(I,J))*(1.-ZE)+(DR(I+1,J+1)-DR(I,J+1))*ZE)*ZR
      DRR=(DR1+DR2+DR(I,J))
      GO TO 400
  300 DEE=0.0
      DRR=0.0
      GO TO 400
  320 DEE=DE(I,J)+(DE(I,J+1)-DE(I,J))*ZR
      DRR=DR(I,J)+(DR(I,J+1)-DR(I,J))*ZR
      GO TO 400
  340 DELT=(E-ED(I))/(ED(I+1)-ED(I))
      DEE=DELT*(DE(I+1,J)-DE(I,J))+DE(I,J)
      DRR=DELT*(DR(I+1,J)-DR(I,J))+DR(I,J)
  400 DRR=DRR*.30480-03
      RETURN
      END
```

APPENDIX H
SUBROUTINE STATUS PROGRAM LISTING

```
* THIS ROUTINE DECODES STATUS INFO AND PACKS IT INTO THE OUTPUT BUFFER
*
          CSECT
          ENTRY STATUS
STATUS    SAVEL
          DROP  15
          CNOP  0,4
           BALR  2,0
           USING START,2,3
START     L     3,BASA
          L     4,DUBUF
          L     5,DUBUF
          L     6,DUBUF
          A     5,=F'4096'
          A     6,=F'8192'
          USING DBUF,4,5,6
          B     START1
DUBUF     DC    V(ICOM)
BASA      DC    A(START+4096)
          SPACE
START1    LA    8,WD239
          A     8,INDEX
          MVC   WORD39(3),0(8)
          LA    8,WD264
          A     8,INDEX
          MVC   WORD64(3),0(8)
          LA    8,WD272
          A     8,INDEX
          MVC   WORD72(3),0(8)
          MVC   WORD73(3),3(8)
          SPACE
          L     9,WORD39
          N     9,=X'00800000'          MASK FOR WORD 239
          ST    9,WORD39
          L     9,WORD64
          N     9,=X'FFFFE000'          MASK FOR WORD 264
          ST    9,WORD64
          L     9,WORD72
          N     9,=X'A7F3C700'          MASK FOR WORD 272
          ST    9,WORD72
          L     9,WORD73
          N     9,=X'CF1FF700'
          ST    9,WORD73
          SPACE
          SR    9,9
          ST    9,ISTSW                 CLEAR STATUS PRINT SWITCH
          L     9,WORD39
          C     9,OWORD39
          BNE   XFERW
          L     9,WORD64
          C     9,OWORD64
          BNE   XFERW
          L     9,WORD72
          C     9,OWORD72
          BNE   XFERW
          L     9,WORD73
          C     9,OWORD73
          BNE   XFERW
```

```
         B      RETUR
         SPACE
XFERW    L      9,WORD39
         ST     9,OWORD39
         L      9,WORD64
         ST     9,OWORD64
         L      9,WORD72
         ST     9,OWORD72
         L      9,WORD73
         ST     9,OWORD73
         SPACE
         L      9,ISTAT2
         LA     9,1(9)
         ST     9,ISTAT2
         C      9,=F'101'
         BL     SETSW1
         ST     9,ISTAT1
SETSW1   L      9,=F'1'
         ST     9,ISTSW                  SET STATUS PRINT SWITCH
         SPACE
         L      9,WORD72
         N      9,=X'00000700'            BIT 22-24
         SRL    9,8
         A      9,=A(DTAC)
         MVC    STAT(1),0(9)
         L      9,WORD72
         N      9,=X'20000000'           BIT 3
         SRL    9,29
         A      9,=A(SLWB)
         MVC    STAT+4(1),0(9)
         L      9,WORD72
         N      9,=X'04C00000'            BIT 6
         SRL    9,26
         A      9,=A(NWN)
         MVC    STAT+8(1),0(9)
         L      9,WORD72
         N      9,=X'02000000'            BIT 7
         SRL    9,25
         A      9,=A(GOT)
         MVC    STAT+12(1),0(9)
         L      9,WORD73
         N      9,=X'00010000'            BIT 16
         SRL    9,16
         A      9,=A(EEC)
         MVC    STAT+16(1),0(9)
         L      9,WORD73
         N      9,=X'00000700'            BIT 22-24
         SRL    9,8
         A      9,=A(DTWC)
         MVC    STAT+20(1),0(9)
         L      9,WORD73
         N      9,=X'00080000'            BIT 13
         SRL    9,19
         A      9,=A(N12)
         MVC    STAT+24(1),0(9)
         L      9,WORD73
         N      9,=X'00040000'            BIT 14
```

```
         SRL   9,18
         A     9,=A(GHL)
         MVC   STAT+28(1),0(9)
         L     9,WORD39
         N     9,=X'00800000'
         SRL   9,23
         A     9,=A(MIC)
         MVC   STAT+32(1),0(9)
         L     9,WORD72
         N     9,=X'80000000'
         SRL   9,31
         A     9,=A(S12)
         MVC   STAT+36(1),0(9)
         L     9,WORD73
         N     9,=X'00008000'
         SRL   9,15
         A     9,=A(CON)
         MVC   STAT+40(1),0(9)
         L     9,WORD73
         N     9,=X'00100000'
         SRL   9,20
         ST    9,QTEMP
         A     9,=A(NBO)
         MVC   STAT+41(1),0(9)
         L     9,WORD64
         N     9,=X'FFFFE000'
         SRL   9,13
         C     9,=F'0'
         BNE   NZSTMP
         L     9,=F'66666'
         ST    9,STEMP
         B     ZSTMP
NZSTMP   ST    9,STEMP
         L     9,=F'10000000'
         SR    8,8
         D     8,STEMP
         ST    9,STEMP                  TRANSMITTED PRF
         SPACE
         L     9,INBUF
         SRL   9,31
         C     9,ZERO
         BNE   WBAND
         SPACE
NBAND    L     9,WORD73                 IN NARROW BAND
         N     9,=X'01000000'           BIT 8
         SRL   9,24
         C     9,ZERO
         BE    SLVOUT
         SPACE
XDIV     L     8,FOUR                   IN DOUBLET MODE
XDIV1    ST    8,DIVSR
         B     NEWPRF
         SPACE
SLVOUT   L     9,WORD73
         N     9,=X'08000000'           BIT 5
         SRL   9,27
```

```
         C     9,ZERO
         BE    NBNWBN
         B     XDIV                    IN SLAVED DOUBLET MODE
NBNWBN   L     9,WORD73
         N     9,=X'00100000'          BIT 12
         SRL   9,20
         C     9,ZERO
         BE    NODIVS
         L     8,TWO
         B     XDIV1                   NB/WB E.C.P.
NODIVS   L     8,ONE
         B     XDIV1                   NB ONLY
         SPACE
WBAND    L     9,WORD73
         N     9,=X'01000000'          BIT 8
         SRL   9,24
         C     9,ZERO
         BNE   SLVDUB2
         L     8,TWO                   IN DOUBLET MODE
         B     XDIV1
SLVDUB2  L     9,WORD73
         N     9,=X'08000000'          BIT 5
         SRL   9,27
         C     9,ZERO
         BNE   XDIV                    IN SLAVED DOUBLET MODE
         L     8,TWO
         B     XDIV1                   WB ONLY
         SPACE
NEWPRF   SR    8,8
         L     9,STEMP
         D     8,DIVSR
         ST    9,STEMP
ZSTMP    MVC   STAT+44(4),STEMP
         SPACE
         L     9,WORD72
         N     9,=X'00C30000'
         SRA   9,16
         A     9,=A(DPC)
         MVC   STAT+48(1),0(9)
         L     9,WORD72
         N     9,=X'01F00000'          BIT 8-12
         SRL   9,19                    RIGHT JUSTIFY AND MULTI BY 2
         C     9,=F'40'
         BL    INRANGE
         L     9,=F'0'
INRANGE  A     9,=A(CTN)
         MVC   STAT+52(2),0(9)
         L     9,WORD73                BIT5
         N     9,=X'08000000'
         SRL   9,27
         ST    9,WBSAVE
         A     9,=A(SLWB)
         MVC   STAT+56(1),0(9)
         L     9,WBSAVE
         C     9,ZERO
         BNE   BB6
         MVI   STAT+60,C'0'
         MVI   STAT+64,C'0'
```

```
         B      DBLTT
BB6      L      9,WCRD73                    BIT 6
         N      9,=X'04000000'
         SRL    9,26
         A      9,=A(WBS2)
         MVC    STAT+60(1),0(9)
         L      9,WCRD73                    BIT 7
         N      9,=X'02000000'
         SRL    9,25
         A      9,=A(WBS3)
         MVC    STAT+64(1),0(9)
DBLTT    L      9,WCRD73                    BIT 8
         N      9,=X'01000000'
         SRL    9,24
         A      9,=A(DBL1)
         MVC    STAT+68(1),0(9)
RETUR    RETL
DTAC     DC     CL8'DTA*C***'
SLWB     DC     CL2'DS'
AI2      DC     CL4'1122'
LWN      DC     CL2'NW'
GOT      DC     CL2'DT'
EEC      DC     CL2'CF'
DTWC     DC     CL8'DTW*C***'
N12      DC     CL2'21'
GHL      DC     CL2'HI'
MIC      DC     CL2'**'
S12      DC     CL2'OP'
CON      DC     CL2'NC'
DPC      DC     CL4'DPC*'
CTN      DC     CL40'**T1T2T3T4T5T6N1N2N3N4I1I2I3I4F1F2F3B*P*'
WBS1     DC     CL2'01'
WBS2     DC     CL2'NX'
WBS3     DC     CL2'MA'
DBL1     DC     CL2'00'
BL       DC     CL1'-'
NBO      DC     CL2'0W'
         CNOP   0,4
WORD39   DC     F'0'
WORD72   DC     F'0'
WORD73   DC     F'0'
WORD64   DC     F'0'
CWCRD39  DC     F'0'
CWCRD64  DC     F'0'
CWCRD72  DC     F'0'
CWCRD73  DC     F'0'
STEMP    DC     F'0'
CTEMP    DC     F'0'
ZERO     DC     F'0'
CNE      DC     F'1'
TWC      DC     F'2'
FOUR     DC     F'4'
WBSAVE   DC     F'0'
DIVSR    DC     F'0'
DBUF     DSECT
INBUF    DS     CL3
WD1      DS     CL3
```

```
                DS      CL18
WD18            DS      CL3
WD19            DS      CL3
                DS      CL27
WD29            DS      CL3
WD30            DS      CL3
                DS      CL252
WD115           DS      CL3
WD116           DS      CL3
WD117           DS      CL3
                DS      CL345
WD233           DS      CL3
WD234           DS      CL3
                DS      CL3
WD236           DS      CL3
WD237           DS      CL3
                DS      CL3
WD239           DS      CL3
WD240           DS      CL3
WD241           DS      CL3
WD242           DS      CL3
WD243           DS      CL3
WD244           DS      CL3
WD245           DS      CL3
WD246           DS      CL3
                DS      CL18
WD253           DS      CL3
                DS      CL27
WD263           DS      CL3
WD264           DS      CL3
WD265           DS      CL3
WD266           DS      CL3
WD267           DS      CL3
WD268           DS      CL3
WD269           DS      CL3
WD270           DS      CL3
WD271           DS      CL3
WD272           DS      CL3
WD273           DS      CL3
WD274           DS      CL3
WD275           DS      CL3
WD276           DS      CL3
WD277           DS      CL3
WD278           DS      CL3
WD279           DS      CL3
WD280           DS      CL3
                DS      CL6369
IAZ             DS      1F
IEL             DS      1F
INDEX           DS      1F
IPPRCS          DS      1F
IORS            DS      1F
IRANGE          DS      1F
IPKPWR          DS      1F
IRDOT           DS      1F
IALT            DS      1F
INDAZ           DS      1F
```

```
JNDAZ     DS    1F
INDEL     DS    1F
IRB54     DS    1F
IRB85     DS    1F
IOPRCS    DS    1F
I24081    DS    1F
I24082    DS    1F
I24083    DS    1F
I2418     DS    1F
I24       DS    1F
I24       DS    1F
XPPAGC    DS    1F
IBETA     DS    1F
IBETASW   DS    1F
BANC      DS    1F
NSW       DS    1F
RBIAS     DS    8F
ISVPR     DS    1F
IHRS      DS    1F
IMIN      DS    1F
ISEC      DS    1F
IMSEC     DS    1F
STAT      DS    21F
TRBIAS    DS    1F
ISTAT1    DS    1F
ISTAT2    DS    1F
ISTAT3    DS    1F
ISTAT4    DS    1F
IALSW     DS    1F
ISTSW     DS    1F
NBWB      DS    1F
ISIGNO    DS    1F
I1158Z    DS    1F
JCON      DS    F
NBEG      DS    F
NEND      DS    F
ITST      DS    F
NUMPRI    DS    F
XOPAGC    DS    F
ITBAND    DS    F
ITAPNO    DS    F
IPRF      DS    F
IPOLAR    DS    F
ISSERR    DS    F
PIFA      DS    16F
CIFA      DS    16F
PFSA      DS    1F
CFSA      DS    1F
PSSA      DS    1F
CSSA      DS    1F
PSSL      DS    1F
CSSL      DS    1F
ICODE     DS    F
I27365    DS    F
I27366    DS    F
I27367    DS    F
I27368    DS    F
IMCVP     DS    F
IMCVC     DS    F
IOFFST    DS    F
          END
```